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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies the Radio Resource Control protocol for the radio interface between UE and NG-RAN.

The scope of the present document also includes:

- the radio related information transported in a transparent container between source gNB and target gNB upon inter gNB handover;
- the radio related information transported in a transparent container between a source or target gNB and another system upon inter RAT handover.
- the radio related information transported in a transparent container between a source eNB and target gNB during E-UTRA-NR Dual Connectivity.

The RRC protocol is also used to configure the radio interface between an IAB-node and its parent node [2].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1]	3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
[2]	3GPP TS 38.300: "NR; Overall description; Stage 2".
[3]	3GPP TS 38.321: "NR; Medium Access Control (MAC); Protocol specification".
[4]	3GPP TS 38.322: "NR; Radio Link Control (RLC) protocol specification".
[5]	3GPP TS 38.323: "NR; Packet Data Convergence Protocol (PDCP) protocol specification".
[6]	ITU-T Recommendation X.680 (08/2015) "Information Technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation" (Same as the ISO/IEC International Standard 8824-1).
[7]	ITU-T Recommendation X.681 (08/2015) "Information Technology – Abstract Syntax Notation One (ASN.1): Information object specification" (Same as the ISO/IEC International Standard 8824-2).
[8]	ITU-T Recommendation X.691 (08/2015) "Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)" (Same as the ISO/IEC International Standard 8825-2).
[9]	3GPP TS 38.215: "NR; Physical layer measurements".
[10]	3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol Specification".
[11]	3GPP TS 33.501: "Security Architecture and Procedures for 5G System".
[12]	3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".

[13]	3GPP TS 38.213: "NR; Physical layer procedures for control".
[14]	3GPP TS 38.133: "NR; Requirements for support of radio resource management".
[15]	3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".
[16]	3GPP TS 38.211: "NR; Physical channels and modulation".
[17]	3GPP TS 38.212: "NR; Multiplexing and channel coding".
[18]	ITU-T Recommendation X.683 (08/2015) "Information Technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications" (Same as the ISO/IEC International Standard 8824-4).
[19]	3GPP TS 38.214: "NR; Physical layer procedures for data".
[20]	3GPP TS 38.304: "NR; User Equipment (UE) procedures in Idle mode and RRC Inactive state".
[21]	3GPP TS 23.003: "Numbering, addressing and identification".
[22]	3GPP TS 36.101: "E-UTRA; User Equipment (UE) radio transmission and reception".
[23]	3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".
[24]	3GPP TS 37.324: "Service Data Adaptation Protocol (SDAP) specification".
[25]	3GPP TS 22.261: "Service requirements for the 5G System".
[26]	3GPP TS 38.306: "User Equipment (UE) radio access capabilities".
[27]	3GPP TS 36.304: "E-UTRA; User Equipment (UE) procedures in idle mode".
[28]	ATIS 0700041: "WEA 3.0: Device-Based Geo-Fencing".
[29]	3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".
[30]	3GPP TS 33.401: "3GPP System Architecture Evolution (SAE); Security architecture".
[31]	3GPP TS 36.211: "E-UTRA; Physical channels and modulation".
[32]	3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".
[33]	3GPP TS 36.104:"E-UTRA; Base Station (BS) radio transmission and reception".
[34]	3GPP TS 38.101-3 "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".
[35]	3GPP TS 38.423: "NG-RAN, Xn application protocol (XnAP)".
[36]	3GPP TS 38.473: "NG-RAN; F1 application protocol (F1AP)".
[37]	3GPP TS 36.423: "E-UTRA; X2 application protocol (X2AP)".
[38]	3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core network protocols; Stage 3".
[39]	3GPP TS 38.101-2 "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".
[40]	3GPP TS 36.133:"E-UTRA; Requirements for support of radio resource management".
[41]	3GPP TS 37.340: "E-UTRA and NR; Multi-connectivity; Stage 2".
[42]	3GPP TS 38.413: "NG-RAN, NG Application Protocol (NGAP)".
[43]	3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[44]	3GPP TR 36.816: "Evolved Universal Terrestrial Radio Access (E-UTRA); Study on signalling and procedure for interference avoidance for in-device coexistence ".
[45]	3GPP TS 25.331: "Universal Terrestrial Radio Access (UTRA); Radio Resource Control (RRC); Protocol specification".
[46]	3GPP TS 25.133: "Requirements for Support of Radio Resource Management (FDD)".
[47]	3GPP TS 38.340: "Backhaul Adaptation Protocol (BAP) specification"
[48]	3GPP TS 37.213: "Physical layer procedures for shared spectrum channel access".
[49]	3GPP TS 37.355: "LTE Positioning Protocol (LPP)".
[50]	IEEE 802.11-2012, Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications, IEEE Std.
[51]	Bluetooth Special Interest Group: "Bluetooth Core Specification v5.0", December 2016.
[52]	3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".
[53]	3GPP TS 38.314: "NR; layer 2 measurements".
[54]	Void.
[55]	3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services".
[56]	3GPP TS 23.285: "Technical Specification Group Services and System Aspects; Architecture enhancements for V2X services".
[57]	3GPP TS 24.587: "Technical Specification Group Core Network and Terminals; Vehicle-to-Everything (V2X) services in 5G System (5GS)".
[58]	Military Standard WGS84 Metric MIL-STD-2401 (11 January 1994): "Military Standard Department of Defence World Geodetic System (WGS)".
[59]	3GPP TS 38.101-4 "NR; User Equipment (UE) radio transmission and reception; Part 4: Performance Requirements".
[60]	3GPP TS 33.536: "Technical Specification Group Services and System Aspects; Security aspects of 3GPP support for advanced Vehicle-to-Everything (V2X) services".
[61]	3GPP TS 37.320: "Radio measurement collection for Minimization of Drive Tests (MDT); Overall description; Stage 2".
[62]	3GPP TS 36.306: "User Equipment (UE) radio access capabilities".
[63]	3GPP TS 38.174: "NR; Integrated Access and Backhaul (IAB) radio transmission and reception".
[64]	3GPP TS 38.472: "NG-RAN; F1 signalling transport".
[65]	3GPP TS 23.304: "Proximity based Services (ProSe) in the 5G System (5GS)".
[66]	3GPP TS 38.351: "NR; Sidelink Relay Adaptation Protocol (SRAP) Specification".
[67]	3GPP TS 23.247: "Architectural enhancements for 5G multicast-broadcast services; Stage 2"
[68]	3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".
[69]	3GPP TS 26.114: "IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction".
[70]	3GPP TS 26.118: "Virtual Reality (VR) profiles for streaming applications".

[71]	NIMA TR 8350.2, Third Edition, Amendment 1, 3 January 2000: "DEPARTMENT OF DEFENSE WORLD GEODETIC SYSTEM 1984".
[72]	3GPP TS 24.554: "Technical Specification Group Core Network and Terminals; Proximity-services (ProSe) in 5G System (5GS) protocol".
[73]	3GPP TS 38.305: "NG Radio Access Network (NG-RAN); Stage 2 functional specification of User Equipment (UE) positioning in NG-RAN".
[74]	3GPP TS 23.122: "Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode".
[75]	3GPP TS 38.101-5: "User Equipment (UE) radio transmission and reception; Part 5: Satellite access Radio Frequency (RF) and performance requirements".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

AM MRB: An MRB associated with at least an AM RLC bearer for PTP transmission.

BH RLC channel: An RLC channel between two nodes, which is used to transport backhaul packets.

Broadcast MRB: A radio bearer configured for MBS broadcast delivery.

CEIL: Mathematical function used to 'round up' i.e. to the nearest integer having a higher or equal value.

DAPS bearer: a bearer whose radio protocols are located in both the source gNB and the target gNB during DAPS handover to use both source gNB and target gNB resources.

Dedicated signalling: Signalling sent on DCCH logical channel between the network and a single UE.

Dormant BWP: The dormant BWP is one of downlink BWPs configured by the network via dedicated RRC signalling. In the dormant BWP, the UE stops monitoring PDCCH on/for the SCell, but continues performing CSI measurements, Automatic Gain Control (AGC) and beam management, if configured. For each serving cell other than the SpCell or PUCCH SCell, the network may configure one BWP as a dormant BWP.

Field: The individual contents of an information element are referred to as fields.

FLOOR: Mathematical function used to 'round down' i.e. to the nearest integer having a lower or equal value.

Frequency Selection Area ID: An identity used for broadcast MBS session to guide the frequency selection of the UE as defined in TS 23.247 [67].

Global cell identity: An identity to uniquely identifying an NR cell. It is consisted of *cellIdentity* and *plmn-Identity* of the first *PLMN-Identity* in *plmn-IdentityList* in SIB1.

Information element: A structural element containing single or multiple fields is referred as information element.

MBS Radio Bearer: A radio bearer that is configured for MBS delivery.

Multicast/Broadcast Service: A point-to-multipoint service as defined in TS 23.247 [67].

Multicast MRB: A radio bearer configured for MBS multicast delivery.

MUSIM gap: Period that the UE may use to perform MUSIM operations.

NCSG: Network controlled small gap as defined in TS 38.133 [14].

NPN-only Cell: A cell that is only available for normal service for NPNs' subscriber. An NPN-capable UE determines that a cell is NPN-only Cell by detecting that the *cellReservedForOtherUse* IE is set to true while the *npn-IdentityInfoList* IE is present in *CellAccessRelatedInfo*.

NR sidelink communication: AS functionality enabling at least V2X Communication as defined in TS 23.287 [55], and ProSe Communication (including ProSe UE-to-Network Relay and non-Relay communication) as defined in TS 23.304 [65] between two or more nearby UEs, using NR technology but not traversing any network node.

NR sidelink discovery: AS functionality enabling ProSe non-Relay Discovery and ProSe UE-to-Network Relay discovery for Proximity based Services as defined in TS 23.304 [65] between two or more nearby UEs, using NR technology but not traversing any network node.

PNI-NPN identity: an identifier of a PNI-NPN comprising of a PLMN ID and a CAG -ID combination.

Primary Cell: The MCG cell, operating on the primary frequency, in which the UE either performs the initial connection establishment procedure or initiates the connection re-establishment procedure.

PC5 Relay RLC channel: An RLC channel between L2 U2N Remote UE and L2 U2N Relay UE, which is used to transport packets over PC5 for L2 UE-to-Network relay.

Primary SCG Cell: For dual connectivity operation, the SCG cell in which the UE performs random access when performing the Reconfiguration with Sync procedure.

Primary Timing Advance Group: Timing Advance Group containing the SpCell.

PUCCH SCell: An SCell configured with PUCCH.

PUSCH-Less SCell: An SCell configured without PUSCH.

RedCap UE: A UE with reduced capabilities as specified in clause 4.2.21.1 in TS 38.306 [26].

RLC bearer configuration: The lower layer part of the radio bearer configuration comprising the RLC and logical channel configurations.

Secondary Cell: For a UE configured with CA, a cell providing additional radio resources on top of Special Cell.

Secondary Cell Group: For a UE configured with dual connectivity, the subset of serving cells comprising of the PSCell and zero or more secondary cells.

Serving Cell: For a UE in RRC_CONNECTED not configured with CA/DC there is only one serving cell comprising of the primary cell. For a UE in RRC_CONNECTED configured with CA/DC the term 'serving cells' is used to denote the set of cells comprising of the Special Cell(s) and all secondary cells.

Small Data Transmission: A procedure used for transmission of data and/or signalling over allowed radio bearers in RRC_INACTIVE state (i.e. without the UE transitioning to RRC_CONNECTED state).

SNPN identity: an identifier of an SNPN comprising of a PLMN ID and an NID combination.

Special Cell: For Dual Connectivity operation the term Special Cell refers to the PCell of the MCG or the PSCell of the SCG, otherwise the term Special Cell refers to the PCell.

Split SRB: In MR-DC, an SRB that supports transmission via MCG and SCG as well as duplication of RRC PDUs as defined in TS 37.340 [41].

SSB Frequency: Frequency referring to the position of resource element RE=#0 (subcarrier #0) of resource block RB#10 of the SS block.

U2N Relay UE: A UE that provides functionality to support connectivity to the network for U2N Remote UE(s).

U2N Remote UE: A UE that communicates with the network via a U2N Relay UE.

Uu Relay RLC channel: An RLC channel between L2 U2N Relay UE and gNB, which is used to transport packets over Uu for L2 UE-to-Network relay.

UE Inactive AS Context: UE Inactive AS Context is stored when the connection is suspended and restored when the connection is resumed. It includes information as defined in clause 5.3.8.3.

V2X sidelink communication: AS functionality enabling V2X Communication as defined in TS 23.285 [56], between nearby UEs, using E-UTRA technology but not traversing any network node.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

5GC 5G Core Network
ACK Acknowledgement
AM Acknowledged Mode
ARQ Automatic Repeat Request
AS Access Stratum

ASN.1 Abstract Syntax Notation One BAP Backhaul Adaptation Protocol BCD Binary Coded Decimal BFD Beam Failure Detection

BH Backhaul
BLER Block Error Rate
BWP Bandwidth Part
CA Carrier Aggregation
CAG Closed Access Group

CAG-ID Closed Access Group Identifier CAPC Channel Access Priority Class

CBR Channel Busy Ratio
CCCH Common Control Channel
CFR Common Frequency Resources

CG Cell Group

CHO Conditional Handover CLI Cross Link Interference

CMAS Commercial Mobile Alert Service

CP Control Plane

CPA Conditional PSCell Addition CPC Conditional PSCell Change

C-RNTI Cell RNTI

CSI Channel State Information
DAPS Dual Active Protocol Stack

DC Dual Connectivity

DCCH Dedicated Control Channel
DCI Downlink Control Information

DCP DCI with CRC scrambled by PS-RNTI

DFN Direct Frame Number

DL Downlink

DL-PRS Downlink Positioning Reference Signal

DL-SCH Downlink Shared Channel
DM-RS Demodulation Reference Signal

DRB (user) Data Radio Bearer
DRX Discontinuous Reception
DTCH Dedicated Traffic Channel
ECEF Earth-Centered, Earth-Fixed
ECI Earth-Centered Inertial

EN-DC E-UTRA NR Dual Connectivity with E-UTRA connected to EPC

EPC Evolved Packet Core EPS Evolved Packet System

ETWS Earthquake and Tsunami Warning System
E-UTRA Evolved Universal Terrestrial Radio Access

E-UTRA/5GC E-UTRA connected to 5GC E-UTRA/EPC E-UTRA connected to EPC

E-UTRAN Evolved Universal Terrestrial Radio Access Network

FDD Frequency Division Duplex

FFS For Further Study

G-CS-RNTI Group Configured Scheduling RNTI
GERAN GSM/EDGE Radio Access Network
GIN Group ID for Network selection
GNSS Global Navigation Satellite System

G-RNTI Group RNTI

GSM Global System for Mobile Communications

HARQ Hybrid Automatic Repeat Request HRNN Human Readable Network Name HSDN High Speed Dedicated Network

H-SFN Hyper SFN

IAB Integrated Access and Backhaul

IAB-DU IAB-node DU

IAB-MT IAB Mobile Termination IDC In-Device Coexistence IE Information element

IMSI International Mobile Subscriber Identity

kB Kilobyte (1000 bytes)

L1 Layer 1 L2 Layer 2 L3 Layer 3

LBT Listen Before Talk
LEO Low Earth Orbit
MAC Medium Access Control
MBS Multicast/Broadcast Service

MBS FSAI MBS Frequency Selection Area Identity

MCCH MBS Control Channel MCG Master Cell Group

MDT Minimization of Drive Tests
MIB Master Information Block
MPE Maximum Permissible Exposure

MRB MBS Radio Bearer

MR-DC Multi-Radio Dual Connectivity

MTCH MBS Traffic Channel

MTSI Multimedia Telephony Service for IMS MUSIM Multi-Universal Subscriber Identity Module

N/A Not Applicable

NE-DC NR E-UTRA Dual Connectivity

(NG)EN-DC E-UTRA NR Dual Connectivity (covering E-UTRA connected to EPC or 5GC)

NGEN-DC E-UTRA NR Dual Connectivity with E-UTRA connected to 5GC

NID Network Identifier
NPN Non-Public Network
NR-DC NR-NR Dual Connectivity
NR/5GC NR connected to 5GC
NSAG Network Slice AS Group
NTN Non-Terrestrial Network

PCell Primary Cell

PDCP Packet Data Convergence Protocol

PDU Protocol Data Unit PEI Paging Early Indication

PEI-O Paging Early Indication-Occasion
PLMN Public Land Mobile Network

PNI-NPN Public Network Integrated Non-Public Network

posSIB Positioning SIB
PPW PRS Processing

PPW PRS Processing Window PRS Positioning Reference Signal

PSCell Primary SCG Cell
PTM Point to Multipoint
PTP Point to Point

PWS Public Warning System
QoE Quality of Experience
QoS Quality of Service

RAN Radio Access Network
RAT Radio Access Technology
RLC Radio Link Control
RLM Radio Link Monitoring

RMTC RSSI Measurement Timing Configuration

RNA RAN-based Notification Area
RNTI Radio Network Temporary Identifier
ROHC Robust Header Compression

RPLMN Registered Public Land Mobile Network

RRC Radio Resource Control RS Reference Signal

SBAS Satellite Based Augmentation System

SCell Secondary Cell
SCG Secondary Cell Group
SCS Subcarrier Spacing
SD-RSRP Sidelink Discovery RSRP
SDT Small Data Transmission
SFN System Frame Number

SFTD SFN and Frame Timing Difference

SI System Information
SIB System Information Block

SL Sidelink

SLSS Sidelink Synchronisation Signal SNPN Stand-alone Non-Public Network

SpCell Special Cell

SRAP Sidelink Relay Adaptation Protocol

SRB Signalling Radio Bearer
SRS Sounding Reference Signal
SSB Synchronization Signal Block
TAG Timing Advance Group
TDD Time Division Duplex
TEG Timing Error Group
TM Transparent Mode

TMGI Temporary Mobile Group Identity

U2N UE-to-Network

UDC Uplink Data Compression

UE User Equipment

UL Uplink

UM Unacknowledged Mode

UP User Plane VR Virtual Reality

In the ASN.1, lower case may be used for some (parts) of the above abbreviations e.g. c-RNTI.

4 General

4.1 Introduction

This specification is organised as follows:

- clause 4.2 describes the RRC protocol model;
- clause 4.3 specifies the services provided to upper layers as well as the services expected from lower layers;
- clause 4.4 lists the RRC functions;
- clause 5 specifies RRC procedures, including UE state transitions;
- clause 6 specifies the RRC messages in ASN.1 and description;

- clause 7 specifies the variables (including protocol timers and constants) and counters to be used by the UE;
- clause 8 specifies the encoding of the RRC messages;
- clause 9 specifies the specified and default radio configurations;
- clause 10 specifies generic error handling;
- clause 11 specifies the RRC messages transferred across network nodes;
- clause 12 specifies the UE capability related constraints and performance requirements.

4.2 Architecture

4.2.1 UE states and state transitions including inter RAT

A UE is either in RRC_CONNECTED state or in RRC_INACTIVE state when an RRC connection has been established. If this is not the case, i.e. no RRC connection is established, the UE is in RRC_IDLE state. The RRC states can further be characterised as follows:

- RRC_IDLE:

- A UE specific DRX may be configured by upper layers;
- At lower layers, the UE may be configured with a DRX for PTM transmission of MBS broadcast;
- UE controlled mobility based on network configuration;
- The UE:
 - Monitors Short Messages transmitted with P-RNTI over DCI (see clause 6.5);
 - Monitors a Paging channel for CN paging using 5G-S-TMSI, except if the UE is acting as a L2 U2N Remote UE:
 - If configured by upper layers for MBS multicast reception, monitors a Paging channel for CN paging using TMGI;
 - Performs neighbouring cell measurements and cell (re-)selection;
 - Acquires system information and can send SI request (if configured);
 - Performs logging of available measurements together with location and time for logged measurement configured UEs;
 - Performs idle/inactive measurements for idle/inactive measurement configured UEs;
 - If configured by upper layers for MBS broadcast reception, acquires MCCH change notification and MBS broadcast control information and data.

- RRC INACTIVE:

- A UE specific DRX may be configured by upper layers or by RRC layer;
- At lower layers, the UE may be configured with a DRX for PTM transmission of MBS broadcast;
- UE controlled mobility based on network configuration;
- The UE stores the UE Inactive AS context;
- A RAN-based notification area is configured by RRC layer;
- Transfer of unicast data and/or signalling to/from UE over radio bearers configured for SDT.

The UE:

- Monitors Short Messages transmitted with P-RNTI over DCI (see clause 6.5);
- During SDT procedure, monitors control channels associated with the shared data channel to determine if data is scheduled for it;
- While SDT procedure is not ongoing, monitors a Paging channel for CN paging using 5G-S-TMSI and RAN paging using fullI-RNTI, except if the UE is acting as a L2 U2N Remote UE;
- If configured by upper layers for MBS multicast reception, while SDT procedure is not ongoing, monitors a Paging channel for paging using TMGI;
- Performs neighbouring cell measurements and cell (re-)selection;
- Performs RAN-based notification area updates periodically and when moving outside the configured RAN-based notification area;
- Acquires system information, while SDT procedure is not ongoing, and can send SI request (if configured);
- While SDT procedure is not ongoing, performs logging of available measurements together with location and time for logged measurement configured UEs;
- While SDT procedure is not ongoing, performs idle/inactive measurements for idle/inactive measurement configured UEs;
- If configured by upper layers for MBS broadcast reception, acquires MCCH change notification and MBS broadcast control information and data;
- Transmits SRS for Positioning.

- RRC_CONNECTED:

- The UE stores the AS context;
- Transfer of unicast data to/from UE:
- Transfer of MBS multicast data to UE:
- At lower layers, the UE may be configured with a UE specific DRX;
- At lower layers, the UE may be configured with a DRX for PTM transmission of MBS broadcast and/or a DRX for MBS multicast;
- For UEs supporting CA, use of one or more SCells, aggregated with the SpCell, for increased bandwidth;
- For UEs supporting DC, use of one SCG, aggregated with the MCG, for increased bandwidth;
- Network controlled mobility within NR, to/from E-UTRA, and to UTRA-FDD;
- Network controlled mobility (path switch) between a serving cell and a L2 U2N Relay UE, or vice versa.
- The UE:
 - Monitors Short Messages transmitted with P-RNTI over DCI (see clause 6.5), if configured;
 - Monitors control channels associated with the shared data channel to determine if data is scheduled for it;
 - Provides channel quality and feedback information;
 - Performs neighbouring cell measurements and measurement reporting;
 - Acquires system information;
 - Performs immediate MDT measurement together with available location reporting;
 - If configured by upper layers for MBS broadcast reception, acquires MCCH change notification and MBS broadcast control information and data.

Figure 4.2.1-1 illustrates an overview of UE RRC state machine and state transitions in NR. A UE has only one RRC state in NR at one time.

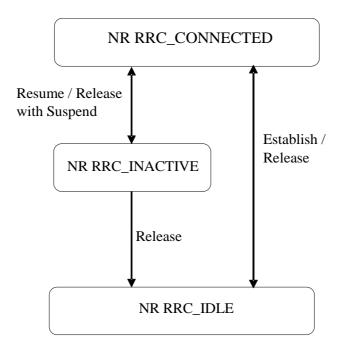


Figure 4.2.1-1: UE state machine and state transitions in NR

Figure 4.2.1-2 illustrates an overview of UE state machine and state transitions in NR as well as the mobility procedures supported between NR/5GC, E-UTRA/EPC and E-UTRA/5GC.

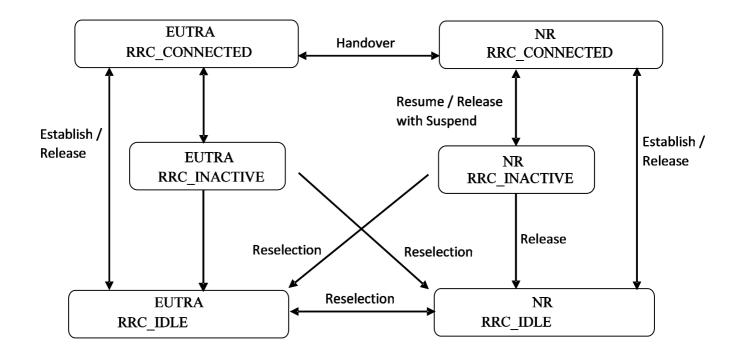


Figure 4.2.1-2: UE state machine and state transitions between NR/5GC, E-UTRA/EPC and E-UTRA/5GC

Figure 4.2.1-3 illustrates the mobility procedure supported between NR/5GC and UTRA-FDD.



Figure 4.2.1-3: Mobility procedure supported between NR/5GC and UTRA-FDD

4.2.2 Signalling radio bearers

"Signalling Radio Bearers" (SRBs) are defined as Radio Bearers (RBs) that are used only for the transmission of RRC and NAS messages. More specifically, the following SRBs are defined:

- SRB0 is for RRC messages using the CCCH logical channel;
- SRB1 is for RRC messages (which may include a piggybacked NAS message) as well as for NAS messages prior to the establishment of SRB2, all using DCCH logical channel;
- SRB2 is for NAS messages and for RRC messages which include logged measurement information, all using DCCH logical channel. SRB2 has a lower priority than SRB1 and may be configured by the network after AS security activation;
- SRB3 is for specific RRC messages when UE is in (NG)EN-DC or NR-DC, all using DCCH logical channel;
- SRB4 is for RRC messages which include application layer measurement report information, all using DCCH logical channel. SRB4 has a lower priority than SRB1 and can only be configured by the network after AS security activation.

In downlink, piggybacking of NAS messages is used only for one dependant (i.e. with joint success/failure) procedure: bearer establishment/modification/release. In uplink piggybacking of NAS message is used only for transferring the initial NAS message during connection setup and connection resume.

NOTE 1: The NAS messages transferred via SRB2 are also contained in RRC messages, which however do not include any RRC protocol control information.

Once AS security is activated, all RRC messages on SRB1, SRB2, SRB3 and SRB4, including those containing NAS messages, are integrity protected and ciphered by PDCP. NAS independently applies integrity protection and ciphering to the NAS messages, see TS 24.501 [23].

Split SRB is supported for all the MR-DC options in both SRB1 and SRB2 (split SRB is not supported for SRB0, SRB3 and SRB4).

For operation with shared spectrum channel access in FR1, SRB0, SRB1 and SRB3 are assigned with the highest priority Channel Access Priority Class (CAPC), (i.e. CAPC = 1) while CAPC for SRB2 is configurable.

4.3 Services

4.3.1 Services provided to upper layers

The RRC protocol offers the following services to upper layers:

- Broadcast of common control information;
- Notification of UEs in RRC IDLE, e.g. about a mobile terminating call;
- Notification of UEs about ETWS and/or CMAS;
- Transfer of dedicated signalling;

- Broadcast of positioning assistance data;
- Transfer of application layer measurement configuration and reporting.

4.3.2 Services expected from lower layers

In brief, the following are the main services that RRC expects from lower layers:

- Integrity protection, ciphering and loss-less in-sequence delivery of information without duplication;

4.4 Functions

The RRC protocol includes the following main functions:

- Broadcast of system information:
 - Including NAS common information;
 - Information applicable for UEs in RRC_IDLE and RRC_INACTIVE (e.g. cell (re-)selection parameters, neighbouring cell information) and information (also) applicable for UEs in RRC_CONNECTED (e.g. common channel configuration information);
 - Including ETWS notification, CMAS notification;
 - Including positioning assistance data.
- RRC connection control:
 - Paging;
 - Establishment/modification/suspension/resumption/release of RRC connection, including e.g. assignment/modification of UE identity (C-RNTI, fullI-RNTI, etc.), establishment/modification/suspension/resumption/release of SRBs (except for SRB0);
 - Access barring;
 - Initial AS security activation, i.e. initial configuration of AS integrity protection (SRBs, DRBs) and AS ciphering (SRBs, DRBs);
 - RRC connection mobility including e.g. intra-frequency and inter-frequency handover, path switch from a
 PCell to a target L2 U2N Relay UE or from a L2 U2N Relay UE to a target PCell, associated AS security
 handling, i.e. key/algorithm change, specification of RRC context information transferred between network
 nodes;
 - Establishment/modification/suspension/resumption/release of RBs carrying user data (DRBs/MRBs);
 - Radio configuration control including e.g. assignment/modification of ARQ configuration, HARQ configuration;
 - In case of DC, cell management including e.g. change of PSCell, addition/modification/release of SCG cell(s);
 - In case of CA, cell management including e.g. addition/modification/release of SCell(s);
 - QoS control including assignment/ modification of semi-persistent scheduling (SPS) configuration and configured grant configuration for DL and UL respectively, assignment/ modification of parameters for UL rate control in the UE, i.e. allocation of a priority and a prioritised bit rate (PBR) for each RB of UE and logical channel of IAB-MT.
 - Recovery from radio link failure.
- Inter-RAT mobility including e.g. AS security activation, transfer of RRC context information;
- Measurement configuration and reporting:

- Establishment/modification/release of measurement configuration (e.g. intra-frequency, inter-frequency and inter- RAT measurements);
- Setup and release of measurement gaps;
- Measurement reporting.
- Configuration of BAP entity and BH RLC channels for the support of IAB-node.
- Other functions including e.g. generic protocol error handling, transfer of dedicated NAS information, transfer of UE radio access capability information.
- Support of self-configuration and self-optimisation.
- Support of measurement logging and reporting for network performance optimisation, as specified in TS 37.320 [61];
- Support of transfer of application layer measurement configuration and reporting.

5 Procedures

5.1 General

5.1.1 Introduction

This clause covers the general requirements.

5.1.2 General requirements

The UE shall:

- 1> process the received messages in order of reception by RRC, i.e. the processing of a message shall be completed before starting the processing of a subsequent message;
- NOTE: Network may initiate a subsequent procedure prior to receiving the UE's response of a previously initiated procedure.
- 1> within a clause execute the steps according to the order specified in the procedural description;
- 1> consider the term 'radio bearer' (RB) to cover SRBs, DRBs and MRBs unless explicitly stated otherwise;
- 1> set the *rrc-TransactionIdentifier* in the response message, if included, to the same value as included in the message received from the network that triggered the response message;
- 1> upon receiving a choice value set to *setup*:
 - 2> apply the corresponding received configuration and start using the associated resources, unless explicitly specified otherwise;
- 1> upon receiving a choice value set to *release*:
 - 2> clear the corresponding configuration and stop using the associated resources;
- 1> in case the size of a list is extended, upon receiving an extension field comprising the entries in addition to the ones carried by the original field (regardless of whether the network signals more entries in total); apply the following generic behaviour unless explicitly stated otherwise:
 - 2> create a combined list by concatenating the additional entries included in the extension field to the original field while maintaining the order among both the original and the additional entries;
 - 2> for the combined list, created according to the previous, apply the same behaviour as defined for the original field.

5.1.3 Requirements for UE in MR-DC

In this specification, the UE considers itself to be in:

- EN-DC, if and only if it is configured with *nr-SecondaryCellGroupConfig* according to TS 36.331[10], and it is connected to EPC,
- NGEN-DC, if and only if it is configured with *nr-SecondaryCellGroupConfig* according to TS 36.331[10], and it is connected to 5GC,
- NE-DC, if and only if it is configured with mrdc-SecondaryCellGroup set to eutra-SCG,
- NR-DC, if and only if it is configured with mrdc-SecondaryCellGroup set to nr-SCG,
- MR-DC, if and only if it is in (NG)EN-DC, NE-DC or NR-DC.

NOTE: This use of these terms deviates from the definition in TS 37.340 [41] and other specifications. In TS 37.340, these terms include also the case where the UE is configured with E-UTRA or NR MCG only (i.e. no NR or E-UTRA SCG) but with one or more bearers terminated in a secondary node (i.e. using NR PDCP).

The UE in (NG)EN-DC only executes a subclause of clause 5 in this specification when the subclause:

- is referred to from a subclause under execution, either in this specification or in TS 36.331 [10]; or
- applies to a message received on SRB3 (if SRB3 is established); or
- applies to field(s), IE(s), UE variable(s) or timer(s) in this specification that the UE is configured with.

When executing a subclause of clause 5 in this specification, the UE follows the requirements in clause 5.1.2 and in all subclauses of this specification applicable to the messages (including processing time requirements), fields, IEs, timers and UE variables indicated in the subclause under execution.

5.2 System information

5.2.1 Introduction

System Information (SI) is divided into the MIB and a number of SIBs and posSIBs where:

- the *MIB* is always transmitted on the BCH with a periodicity of 80 ms and repetitions made within 80 ms (TS 38.212 [17], clause 7.1) and it includes parameters that are needed to acquire *SIB1* from the cell. The first transmission of the *MIB* is scheduled in subframes as defined in TS 38.213 [13], clause 4.1 and repetitions are scheduled according to the period of SSB;

NOTE 1: If the period of SSB is larger than 80 ms, the MIB is transmitted with the same periodicity as that of SSB.

- the *SIB1* is transmitted on the DL-SCH with a periodicity of 160 ms and variable transmission repetition periodicity within 160 ms as specified in TS 38.213 [13], clause 13. The default transmission repetition periodicity of *SIB1* is 20 ms but the actual transmission repetition periodicity is up to network implementation. For SSB and CORESET multiplexing pattern 1, *SIB1* repetition transmission period is 20 ms. For SSB and CORESET multiplexing pattern 2/3, *SIB1* transmission repetition period is the same as the SSB period (TS 38.213 [13], clause 13). *SIB1* includes information regarding the availability and scheduling (e.g. mapping of SIBs to SI message, periodicity, SI-window size) of other SIBs with an indication whether one or more SIBs are only provided on-demand and, in that case, the configuration needed by the UE to perform the SI request. *SIB1* is cell-specific SIB;
- SIBs other than SIB1 and posSIBs are carried in SystemInformation (SI) messages, which are transmitted on the DL-SCH. Only SIBs or posSIBs having the same periodicity can be mapped to the same SI message. SIBs and posSIBs are mapped to the different SI messages. Each SI message is transmitted within periodically occurring time domain windows (referred to as SI-windows with same length for all SI messages). Each SI message is associated with an SI-window and the SI-windows of different SI messages do not overlap. That is, within one SI-window only the corresponding SI message is transmitted. An SI message may be transmitted a number of times within the SI-window. Any SIB or posSIB except SIB1 can be configured to be cell specific or area

specific, using an indication in *SIB1*. The cell specific SIB is applicable only within a cell that provides the SIB while the area specific SIB is applicable within an area referred to as SI area, which consists of one or several cells and is identified by *systemInformationAreaID*;

- The mapping of SIBs to SI messages is configured in *schedulingInfoList* and *schedulingInfoList2*, while the mapping of posSIBs to SI messages is configured in *posSchedulingInfoList* and *schedulingInfoList2*. SIBs and posSIBs are mapped to separate SI messages even when configured using a common *schedulingInfoList2*. Each SIB is contained only in a single SI message. In the case of posSIB, a posSIB carrying GNSS Generic Assistance Data for different GNSS/SBAS [49] is contained in different SI messages. Each SIB and posSIB, including a posSIB carrying GNSS Generic Assistance Data for one GNSS/SBAS, is contained at most once in that SI message;
- For a UE in RRC_CONNECTED, the network can provide system information through dedicated signalling using the *RRCReconfiguration* message, e.g. if the UE has an active BWP with no common search space configured to monitor system information, paging, or upon request from the UE.
- For PSCell and SCells, the network provides the required SI by dedicated signalling, i.e. within an *RRCReconfiguration* message. Nevertheless, the UE shall acquire *MIB* of the PSCell to get SFN timing of the SCG (which may be different from MCG). Upon change of relevant SI for SCell, the network releases and adds the concerned SCell. For PSCell, the required SI can only be changed with Reconfiguration with Sync.

NOTE 2: The physical layer imposes a limit to the maximum size a SIB can take. The maximum SIB1 or SI message size is 2976 bits.

5.2.2 System information acquisition

5.2.2.1 General UE requirements

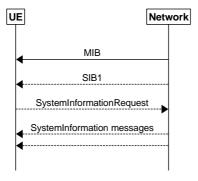


Figure 5.2.2.1-1: System information acquisition

The UE applies the SI acquisition procedure to acquire the AS, NAS- and positioning assistance data information. The procedure applies to UEs in RRC_IDLE, in RRC_INACTIVE and in RRC_CONNECTED.

The UE in RRC_IDLE and RRC_INACTIVE shall ensure having a valid version of (at least) the *MIB*, *SIB1* through *SIB4*, *SIB5* (if the UE supports E-UTRA), *SIB11* (if the UE is configured for idle/inactive measurements), *SIB12* (if UE is capable of NR sidelink communication/discovery and is configured by upper layers to receive or transmit NR sidelink communication/discovery), and *SIB13*, *SIB14* (if UE is capable of V2X sidelink communication and is configured by upper layers to receive or transmit V2X sidelink communication), *SIB15* (if UE is configured by upper layers to report disaster roaming related information), *SIB16* (if the UE is capable of slice-based cell reselection and the UE receives NSAG information for cell reselection from upper layer), *SIB19* (if UE is accessing NR via NTN access).

The UE capable of MBS broadcast which is receiving or interested to receive MBS broadcast service(s) via a broadcast MRB shall ensure having a valid version of *SIB20* and *SIB21*, regardless of the RRC state the UE is in.

The UE shall ensure having a valid version of the posSIB requested by upper layers.

5.2.2.2 SIB validity and need to (re)-acquire SIB

5.2.2.2.1 SIB validity

The UE shall apply the SI acquisition procedure as defined in clause 5.2.2.3 upon cell selection (e.g. upon power on), cell-reselection, return from out of coverage, after reconfiguration with sync completion, after entering the network from another RAT, upon receiving an indication that the system information has changed, upon receiving a PWS notification, upon receiving request (e.g., a positioning request) from upper layers; and whenever the UE does not have a valid version of a stored SIB or posSIB or a valid version of a requested SIB.

When the UE acquires a MIB or a SIB1 or an SI message in a serving cell as described in clause 5.2.2.3, and if the UE stores the acquired SIB, then the UE shall store the associated areaScope, if present, the first PLMN-Identity in the PLMN-IdentityInfoList for non-NPN-only cells or the first NPN identity (SNPN identity in case of SNPN, or PNI-NPN identity in case of PNI-NPN) in the NPN-IdentityInfoList for NPN-only cells, the cellIdentity, the systemInformationAreaID, if present, and the valueTag, if present, as indicated in the si-SchedulingInfo for the SIB. If the UE stores the acquired posSIB, then the UE shall store the associated areaScope, if present, the cellIdentity, the systemInformationAreaID, if present, the valueTag, if provided in assistanceDataSIB-Element, and the expirationTime if provided in assistanceDataSIB-Element. The UE may use a valid stored version of the SI except MIB, SIB1, SIB6, SIB7 or SIB8 e.g. after cell re-selection, upon return from out of coverage or after the reception of SI change indication. The valueTag and expirationTime for posSIB is optionally provided in assistanceDataSIB-Element, as specified in TS 37.355 [49].

A L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE can inform the interested SIB(s) to the connected L2 U2N Relay UE as defined in clause 5.8.9.8.2 and receive the SIB(s) from the L2 U2N Relay UE as defined in clause 5.8.9.8.3. A L2 U2N Remote UE in RRC_CONNECTED receives SIB1 and other SIB(s) in *RRCReconfiguration* message and performs on-demand SI request if required, as defined in clause 5.2.2.3.5 and 5.2.2.3.6. The L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE or RRC_CONNECTED is not required to obtain SI over Uu interface, but it may decide to perform the SI acquisition procedure over Uu interface as defined in clause 5.2.2.3 by UE implementation.

NOTE: The storage and management of the stored SIBs in addition to the SIBs valid for the current serving cell is left to UE implementation.

The UE shall:

- 1> delete any stored version of a SIB after 3 hours from the moment it was successfully confirmed as valid;
- 1> for each stored version of a SIB:
 - 2> if the *areaScope* is associated and its value for the stored version of the SIB is the same as the value received in the *si-SchedulingInfo* for that SIB from the serving cell:
 - 3> if the UE is NPN capable and the cell is an NPN-only cell:
 - 4> if the first NPN identity included in the NPN-IdentityInfoList, the systemInformationAreaID and the valueTag that are included in the si-SchedulingInfo for the SIB received from the serving cell are identical to the NPN identity, the systemInformationAreaID and the valueTag associated with the stored version of that SIB:
 - 5> consider the stored SIB as valid for the cell;
 - 3> else if the first *PLMN-Identity* included in the *PLMN-IdentityInfoList*, the *systemInformationAreaID* and the *valueTag* that are included in the *si-SchedulingInfo* for the SIB received from the serving cell are identical to the *PLMN-Identity*, the *systemInformationAreaID* and the *valueTag* associated with the stored version of that SIB:
 - 4> consider the stored SIB as valid for the cell;
 - 2> if the *areaScope* is not present for the stored version of the SIB and the *areaScope* value is not included in the *si-SchedulingInfo* for that SIB from the serving cell:
 - 3> if the UE is NPN capable and the cell is an NPN-only cell:

- 4> if the first NPN identity in the NPN-IdentityInfoList, the cellIdentity and valueTag that are included in the si-SchedulingInfo for the SIB received from the serving cell are identical to the NPN identity, the cellIdentity and the valueTag associated with the stored version of that SIB:
 - 5> consider the stored SIB as valid for the cell;
- 3> else if the first *PLMN-Identity* in the *PLMN-IdentityInfoList*, the *cellIdentity* and *valueTag* that are included in the *si-SchedulingInfo* for the SIB received from the serving cell are identical to the *PLMN-Identity*, the *cellIdentity* and the *valueTag* associated with the stored version of that SIB:
 - 4> consider the stored SIB as valid for the cell;
- 1> for each stored version of a posSIB:
 - 2> if the *areaScope* is associated and its value for the stored version of the posSIB is the same as the value received in the *posSIB-MappingInfo* for that posSIB from the serving cell and the *systemInformationAreaID* included in the *si-SchedulingInfo* is identical to the *systemInformationAreaID* associated with the stored version of that posSIB:
 - 3> if the *valueTag* (see TS 37.355 [49]) for the posSIB received from the serving cell is identical to the *valueTag* associated with the stored version of that posSIB; or if the *expirationTime* (see TS 37.355 [49]) associated with the stored posSIB has not been expired:
 - 4> consider the stored posSIB as valid for the cell;
 - 2> if the *areaScope* is not present for the stored version of the posSIB and the *areaScope* value is not included in the *posSIB-MappingInfo* for that posSIB from the serving cell and the *cellIdentity* for the posSIB received from the serving cell is identical to the *cellIdentity* associated with the stored version of that posSIB:
 - 3> if the *valueTag* (see TS 37.355 [49]) for the posSIB received from the serving cell is identical to the *valueTag* associated with the stored version of that posSIB; or if the *expirationTime* (see TS 37.355 [49]) associated with the stored posSIB has not been expired:
 - 4> consider the stored posSIB as valid for the cell;

5.2.2.2.2 SI change indication and PWS notification

A modification period is used, i.e. updated SI message (other than SI message for ETWS, CMAS, positioning assistance data, and some NTN-specific information as specified in the field descriptions) is broadcasted in the modification period following the one where SI change indication is transmitted. The modification period boundaries are defined by SFN values for which SFN mod m = 0, where m is the number of radio frames comprising the modification period. The modification period is configured by system information. If H-SFN is provided in SIB1, and UE is configured with eDRX, modification period boundaries are defined by SFN values for which (H-SFN * 1024 + SFN) mod m = 0.

For UEs in RRC_IDLE or RRC_INACTIVE configured to use an eDRX cycle longer than the modification period, an eDRX acquisition period is defined. The boundaries of the eDRX acquisition period are determined by H-SFN values for which H-SFN mod 1024 = 0.

The UE receives indications about SI modifications and/or PWS notifications using Short Message transmitted with P-RNTI over DCI (see clause 6.5). Repetitions of SI change indication may occur within preceding modification period or within preceding eDRX acquisition period. SI change indication is not applicable for SI messages containing posSIBs.

UEs in RRC_IDLE or in RRC_INACTIVE while SDT procedure is not ongoing shall monitor for SI change indication in own paging occasion every DRX cycle. UEs in RRC_CONNECTED shall monitor for SI change indication in any paging occasion at least once per modification period if the UE is provided with common search space, including *pagingSearchSpace, searchSpaceSIB1* and *searchSpaceOtherSystemInformation*, on the active BWP to monitor paging, as specified in TS 38.213 [13], clause 13.

UEs in RRC_INACTIVE while SDT procedure is ongoing shall monitor for SI change indication in any paging occasion at least once per modification period.

During a modification period where ETWS or CMAS transmission is started or stopped, the SI messages carrying the posSIBs scheduled in *posSchedulingInfoList* may change, so the UE might not be able to successfully receive those posSIBs in the remainder of the current modification period and next modification period according to the scheduling information received prior to the change.

ETWS or CMAS capable UEs in RRC_IDLE or in RRC_INACTIVE while SDT procedure is not ongoing shall monitor for indications about PWS notification in its own paging occasion every DRX cycle. ETWS or CMAS capable UEs in RRC_CONNECTED shall monitor for indication about PWS notification in any paging occasion at least once every <code>defaultPagingCycle</code> if the UE is provided with common search space, including <code>pagingSearchSpace</code>, <code>searchSpaceSIB1</code> and <code>searchSpaceOtherSystemInformation</code>, on the active BWP to monitor paging.

ETWS or CMAS capable UEs in RRC_INACTIVE while SDT procedure is ongoing shall monitor for indication about PWS notification in any paging occasion at least once every *defaultPagingCycle*.

For Short Message reception in a paging occasion, the UE monitors the PDCCH monitoring occasion(s) for paging as specified in TS 38.304 [20] and TS 38.213 [13].

A L2 U2N Remote UE is not required to monitor paging occasion for SI modifications and/or PWS notifications. It obtains the updated system information and SIB6/7/8 from the connected L2 U2N Relay UE as defined in clause 5.8.9.9.3.

If the UE receives a Short Message, the UE shall:

- 1> if the UE is ETWS capable or CMAS capable, the *etwsAndCmasIndication* bit of Short Message is set, and the UE is provided with *searchSpaceSIB1* and *searchSpaceOtherSystemInformation* on the active BWP or the initial BWP:
 - 2> immediately re-acquire the SIB1;
 - 2> if the UE is ETWS capable and si-SchedulingInfo includes scheduling information for SIB6:
 - 3> acquire SIB6, as specified in clause 5.2.2.3.2, immediately;
 - 2> if the UE is ETWS capable and si-SchedulingInfo includes scheduling information for SIB7:
 - 3> acquire SIB7, as specified in clause 5.2.2.3.2, immediately;
 - 2> if the UE is CMAS capable and si-SchedulingInfo includes scheduling information for SIB8:
 - 3> acquire SIB8, as specified in clause 5.2.2.3.2, immediately;
- NOTE: In case *SIB6*, *SIB7*, or *SIB8* overlap with a measurement gap it is left to UE implementation how to immediately acquire *SIB6*, *SIB7*, or *SIB8*.
- 1> if the UE is not configured with an eDRX cycle longer than the modification period and the *systemInfoModification* bit of Short Message is set:
 - 2> apply the SI acquisition procedure as defined in clause 5.2.2.3 from the start of the next modification period;
- 1> if the UE is configured with an RRC_IDLE eDRX cycle longer than the modification period and the *systemInfoModification-eDRX* bit of Short Message is set:
 - 2> apply the SI acquisition procedure as defined in clause 5.2.2.3 from the start of the next eDRX acquisition period boundary.

5.2.2.3 Acquisition of System Information

5.2.2.3.1 Acquisition of *MIB* and *SIB1*

The UE shall:

- 1> apply the specified BCCH configuration defined in 9.1.1.1;
- 1> if the UE is in RRC_IDLE or in RRC_INACTIVE; or
- 1> if the UE is in RRC_CONNECTED while T311 is running:
 - 2> acquire the MIB, which is scheduled as specified in TS 38.213 [13];

- 2> if the UE is unable to acquire the MIB;
 - 3> perform the actions as specified in clause 5.2.2.5;
- 2> else:
 - 3> perform the actions specified in clause 5.2.2.4.1.
- 1> if the UE is in RRC_CONNECTED with an active BWP with common search space configured by searchSpaceSIB1 and pagingSearchSpace and has received an indication about change of system information; or
- 1> if the UE is in RRC_CONNECTED with an active BWP with common search space configured by *searchSpaceSIB1* and the UE has not stored a valid version of a SIB or posSIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s) or posSIB(s) in accordance with clause 5.2.2.1, and, UE has not acquired SIB1 in current modification period; or
- 1> if the UE is in RRC_CONNECTED with an active BWP with common search space configured by *searchSpaceSIB1*, and, the UE has not stored a valid version of a SIB or posSIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s) or posSIB(s) in accordance with clause 5.2.2.1, and, *si-BroadcastStatus* for the required SIB(s) or *posSI-BroadcastStatus* for the required posSIB(s) is set to *notbroadcasting* in acquired *SIB1* in current modification period; or
- 1> if the UE is in RRC_IDLE or in RRC_INACTIVE; or
- 1> if the UE is in RRC_CONNECTED while T311 is running:
 - 2> if *ssb-SubcarrierOffset* indicates *SIB1* is transmitted in the cell (TS 38.213 [13]) and if *SIB1* acquisition is required for the UE:
 - 3> acquire the SIB1, which is scheduled as specified in TS 38.213 [13];
 - 3> if the UE is unable to acquire the SIB1:
 - 4> perform the actions as specified in clause 5.2.2.5;
 - 3> else:
 - 4> upon acquiring SIB1, perform the actions specified in clause 5.2.2.4.2.
 - 2> else if SIB1 acquisition is required for the UE and ssb-SubcarrierOffset indicates that SIB1 is not scheduled in the cell:
 - 3> perform the actions as specified in clause 5.2.2.5.
- NOTE 1: The UE in RRC_CONNECTED is only required to acquire broadcasted *SIB1* and MBS broadcast if the UE can acquire it without disrupting unicast or MBS multicast data reception, i.e., the broadcast and unicast/MBS multicast beams are quasi co-located. The UE in RRC_INACTIVE state while SDT procedure is ongoing, is only required to acquire broadcasted *SIB1* and *MIB* if the UE can acquire them without disrupting unicast data reception, i.e. the broadcast and unicast beams are quasi co-located.
- NOTE 2: UE in RRC_INACTIVE that does not support *inactiveStateNTN-r17* enters RRC_IDLE upon cell reselection between TN cell and NTN cell, and initiates the NAS signalling connection recovery (see TS 24.501 [23]).

5.2.2.3.2 Acquisition of an SI message

For SI message acquisition PDCCH monitoring occasion(s) are determined according to searchSpaceOtherSystemInformation. If searchSpaceOtherSystemInformation is set to zero, PDCCH monitoring occasions for SI message reception in SI-window are same as PDCCH monitoring occasions for SIBI where the mapping between PDCCH monitoring occasions and SSBs is specified in TS 38.213[13]. If searchSpaceOtherSystemInformation is not set to zero, PDCCH monitoring occasions for SI message are determined based on search space indicated by searchSpaceOtherSystemInformation. PDCCH monitoring occasions for SI message which are not overlapping with UL symbols (determined according to tdd-UL-DL-ConfigurationCommon) are sequentially numbered from one in the SI window. The $[x \times N+K]^{th}$ PDCCH monitoring occasion (s) for SI message in SI-window corresponds to the K^{th} transmitted SSB, where x = 0, 1, ... X-1, K = 1, 2, ... N, N is the number of actual

transmitted SSBs determined according to *ssb-PositionsInBurst* in *SIB1* and X is equal to CEIL(number of PDCCH monitoring occasions in SI-window/N). The actual transmitted SSBs are sequentially numbered from one in ascending order of their SSB indexes. The UE assumes that, in the SI window, PDCCH for an SI message is transmitted in at least one PDCCH monitoring occasion corresponding to each transmitted SSB and thus the selection of SSB for the reception SI messages is up to UE implementation.

When acquiring an SI message, the UE shall:

- 1> determine the start of the SI-window for the concerned SI message as follows:
 - 2> if the concerned SI message is configured in the schedulingInfoList:
 - 3> for the concerned SI message, determine the number *n* which corresponds to the order of entry in the list of SI messages configured by *schedulingInfoList* in *si-SchedulingInfo* in *SIB1*;
 - 3> determine the integer value $x = (n-1) \times w$, where w is the si-WindowLength;
 - 3> the SI-window starts at the slot #a, where $a = x \mod N$, in the radio frame for which SFN mod T = FLOOR(x/N), where T is the *si-Periodicity* of the concerned SI message and N is the number of slots in a radio frame as specified in TS 38.213 [13];
 - 2> else if the concerned SI message is configured in the *schedulingInfoList2*;
 - 3> determine the integer value $x = (si\text{-}WindowPosition 1) \times w$, where w is the si-WindowLength;
 - 3> the SI-window starts at the slot #a, where $a = x \mod N$, in the radio frame for which SFN mod T = FLOOR(x/N), where T is the *si-Periodicity* of the concerned SI message and N is the number of slots in a radio frame as specified in TS 38.213 [13];
 - 2> else if the concerned SI message is configured in the *posSchedulingInfoList* and *offsetToSI-Used* is not configured:
 - 3> create a concatenated list of SI messages by appending the *posSchedulingInfoList* in *posSI-SchedulingInfo* in *SIB1* to *schedulingInfoList* in *si-SchedulingInfo* in *SIB1*;
 - 3> for the concerned SI message, determine the number *n* which corresponds to the order of entry in the concatenated list;
 - 3> determine the integer value $x = (n 1) \times w$, where w is the si-WindowLength;
 - 3> the SI-window starts at the slot #a, where $a = x \mod N$, in the radio frame for which SFN mod T = FLOOR(x/N), where T is the *posSI-Periodicity* of the concerned SI message and N is the number of slots in a radio frame as specified in TS 38.213 [13];
 - 2> else if the concerned SI message is configured by the *posSchedulingInfoList* and *offsetToSI-Used* is configured:
 - 3> determine the number m which corresponds to the number of SI messages with an associated si-Periodicity of 8 radio frames (80 ms), configured by schedulingInfoList in SIB1;
 - 3> for the concerned SI message, determine the number *n* which corresponds to the order of entry in the list of SI messages configured by *posSchedulingInfoList* in *SIB1*;
 - 3> determine the integer value $x = m \times w + (n-1) \times w$, where w is the si-WindowLength;
 - 3> the SI-window starts at the slot #a, where $a = x \mod N$, in the radio frame for which SFN mod T = FLOOR(x/N) + 8, where T is the *posSI-Periodicity* of the concerned SI message and N is the number of slots in a radio frame as specified in TS 38.213 [13];
- 1> receive the PDCCH containing the scheduling RNTI, i.e. SI-RNTI in the PDCCH monitoring occasion(s) for SI message acquisition, from the start of the SI-window and continue until the end of the SI-window whose absolute length in time is given by *si-WindowLength*, or until the SI message was received;
- 1> if the SI message was not received by the end of the SI-window, repeat reception at the next SI-window occasion for the concerned SI message in the current modification period;

- NOTE 1: The UE is only required to acquire broadcasted SI message if the UE can acquire it without disrupting unicast or MBS multicast data reception, i.e. the broadcast and unicast/MBS multicast beams are quasi co-located.
- NOTE 2: The UE is not required to monitor PDCCH monitoring occasion(s) corresponding to each transmitted SSB in SI-window.
- NOTE 3: If the concerned SI message was not received in the current modification period, handling of SI message acquisition is left to UE implementation.
- NOTE 4: A UE in RRC_CONNECTED may stop the PDCCH monitoring during the SI window for the concerned SI message when the requested SIB(s) are acquired.
- NOTE 5: A UE capable of NR sidelink communication/discovery and configured by upper layers to perform NR sidelink communication/discovery on a frequency, may acquire SIB12 or SystemInformationBlockType28 from a cell other than current serving cell (for RRC_INACTIVE or RRC_IDLE) or current PCell (for RRC_CONNECTED), if SIB12 of current serving cell (for RRC_INACTIVE or RRC_IDLE) or current PCell (for RRC_CONNECTED) does not provide configuration for NR sidelink communication/discovery for the frequency, and if the other cell providing configuration for NR sidelink communication/discovery for the frequency meets the S-criteria as defined in TS 38.304 [20] or TS 36.304 [27].

1> perform the actions for the acquired SI message as specified in clause 5.2.2.4.

5.2.2.3.3 Request for on demand system information

The UE shall, while SDT procedure is not ongoing:

- 1> if SIB1 includes si-SchedulingInfo containing si-RequestConfigSUL and criteria to select supplementary uplink as defined in TS 38.321[3], clause 5.1.1 is met:
 - 2> trigger the lower layer to initiate the Random Access procedure on supplementary uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *si-RequestConfigSUL* corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;
 - 2> if acknowledgement for SI request is received from lower layers:
 - 3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;
- 1> else if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfigRedCap* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met:
 - 2> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *si-RequestConfigRedcap* corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;
 - 2> if acknowledgement for SI request is received from lower layers:
 - 3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else:

- 2> if the UE is not a RedCap UE and if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfig* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met; or
- 2> if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is not configured in *UplinkConfigCommonSIB* and if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfig* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met:
 - 3> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *si-RequestConfig* corresponding to

the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;

- 3> if acknowledgement for SI request is received from lower layers:
 - 4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

2> else:

- 3> apply the default L1 parameter values as specified in corresponding physical layer specifications except for the parameters for which values are provided in *SIB1*;
- 3> apply the default MAC Cell Group configuration as specified in 9.2.2;
- 3> apply the *timeAlignmentTimerCommon* included in *SIB1*;
- 3> apply the CCCH configuration as specified in 9.1.1.2;
- 3> initiate transmission of the *RRCSystemInfoRequest* message with *rrcSystemInfoRequest* in accordance with 5.2.2.3.4;
- 3> if acknowledgement for *RRCSystemInfoRequest* message with *rrcSystemInfoRequest* is received from lower layers:
 - 4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;
- 1> if cell reselection occurs while waiting for the acknowledgment for SI request from lower layers:
 - 2> reset MAC;
 - 2> if SI request is based on RRCSystemInfoRequest message with rrcSystemInfoRequest:
 - 3> release RLC entity for SRB0.

NOTE: After RACH failure for SI request it is up to UE implementation when to retry the SI request.

5.2.2.3.3a Request for on demand positioning system information

The UE shall, while SDT procedure is not ongoing:

- 1> if SIB1 includes posSI-SchedulingInfo containing posSI-RequestConfigSUL and criteria to select supplementary uplink as defined in TS 38.321[3], clause 5.1.1 is met:
 - 2> trigger the lower layer to initiate the Random Access procedure on supplementary uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in posSI-RequestConfigSUL corresponding to the SI message(s) that the UE upper layers require for positioning operations, and for which posSI-BroadcastStatus is set to notBroadcasting;
 - 2> if acknowledgement for SI request is received from lower layers:
 - 3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;
- 1> else if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *SIB1* includes *posSI-SchedulingInfo* containing *posSI-RequestConfigRedCap* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met:
 - 2> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *posSI-RequestConfigRedCap* corresponding to the SI message(s) that the UE upper layers require for positioning operations, and for which *posSI-BroadcastStatus* is set to *notBroadcasting*;
 - 2> if acknowledgement for SI request is received from lower layers:
 - 3> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

1> else:

- 2> if the UE is not a RedCap UE and if SIB1 includes posSI-SchedulingInfo containing posSI-RequestConfig and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met; or
- 2> if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is not configured in *UplinkConfigCommonSIB* and if *SIB1* includes *posSI-SchedulingInfo* containing *posSI-RequestConfig* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met:
 - 3> trigger the lower layer to initiate the Random Access procedure on normal uplink in accordance with TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *posSI-RequestConfig* corresponding to the SI message(s) that the UE upper layers require for positioning operations, and for which *posSI-BroadcastStatus* is set to *notBroadcasting*;
 - 3> if acknowledgement for SI request is received from lower layers:
 - 4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;

2> else:

- 3> apply the default L1 parameter values as specified in corresponding physical layer specifications except for the parameters for which values are provided in *SIB1*;
- 3> apply the default MAC Cell Group configuration as specified in 9.2.2;
- 3> apply the *timeAlignmentTimerCommon* included in *SIB1*;
- 3> apply the CCCH configuration as specified in 9.1.1.2;
- 3> initiate transmission of the RRCSystemInfoRequest message with rrcPosSystemInfoRequest in accordance with 5.2.2.3.4;
- 3> if acknowledgement for *RRCSystemInfoRequest* message with *rrcPosSystemInfoRequest* is received from lower layers:
 - 4> acquire the requested SI message(s) as defined in clause 5.2.2.3.2, immediately;
- 1> if cell reselection occurs while waiting for the acknowledgment for SI request from lower layers:
 - 2> reset MAC;
 - 2> if SI request is based on RRCSystemInfoRequest message with rrcPosSystemInfoRequest:
 - 3> release RLC entity for SRB0.

NOTE: After RACH failure for SI request it is up to UE implementation when to retry the SI request.

5.2.2.3.4 Actions related to transmission of *RRCSystemInfoRequest* message

The UE shall set the contents of RRCSystemInfoRequest message as follows:

- 1> if the procedure is triggered to request the required SI message(s) other than positioning:
 - 2> set the *requested-SI-List* to indicate the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*;
- 1> else if the procedure is triggered to request the required SI message(s) for positioning:
 - 2> set the *requestedPosSI-List* to indicate the SI message(s) that the UE upper layers require for positioning operations, and for which *posSI-BroadcastStatus* is set to *notBroadcasting*.

The UE shall submit the RRCSystemInfoRequest message to lower layers for transmission.

5.2.2.3.5 Acquisition of SIB(s) or posSIB(s) in RRC_CONNECTED

The UE shall:

- 1> if the UE is in RRC_CONNECTED with an active BWP not configured with common search space with the field *searchSpaceOtherSystemInformation* and the UE has not stored a valid version of a SIB or posSIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s) or posSIB(s) in accordance with clause 5.2.2.1, or
- 1> if the UE is in RRC_CONNECTED and acting as a L2 U2N Remote UE and the UE has not stored a valid version of a SIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s) in accordance with clause 5.2.2.1:
 - 2> for the SI message(s) that, according to the *si-SchedulingInfo* or *posSI-SchedulingInfo* in the stored SIB1, contain at least one required SIB or requested posSIB:
 - 3> if *onDemandSIB-Request* is configured and timer T350 is not running:
 - 4> initiate transmission of the *DedicatedSIBRequest* message in accordance with 5.2.2.3.6;
 - 4> start timer T350 with the timer value set to the *onDemandSIB-RequestProhibitTimer*;
- 1> else if the UE is in RRC_CONNECTED with an active BWP configured with common search space with the field *searchSpaceOtherSystemInformation* and the UE has not stored a valid version of a SIB or posSIB, in accordance with clause 5.2.2.1, of one or several required SIB(s) or posSIB(s) in accordance with clause 5.2.2.1:
 - 2> for the SI message(s) that, according to the *si-SchedulingInfo* in the stored SIB1, contain at least one required SIB and for which *si-BroadcastStatus* is set to *broadcasting*:
 - 3> acquire the SI message(s) as defined in clause 5.2.2.3.2;
 - 2> for the SI message(s) that, according to the *si-SchedulingInfo* in the stored SIB1, contain at least one required SIB and for which *si-BroadcastStatus* is set to *notBroadcasting*:
 - 3> if *onDemandSIB-Request* is configured and timer T350 is not running:
 - 4> initiate transmission of the *DedicatedSIBRequest* message in accordance with 5.2.2.3.6;
 - 4> start timer T350 with the timer value set to the *onDemandSIB-RequestProhibitTimer*;
 - 4> acquire the requested SI message(s) corresponding to the requested SIB(s) as defined in clause 5.2.2.3.2.
 - 2> for the SI message(s) that, according to the *posSI-SchedulingInfo* in the stored SIB1, contain at least one requested posSIB and for which *posSI-BroadcastStatus* is set to *broadcasting*:
 - 3> acquire the SI message(s) as defined in clause 5.2.2.3.2;
 - 2> for the SI message(s) that, according to the *posSI-SchedulingInfo* in the stored SIB1, contain at least one requested posSIB and for which *posSI-BroadcastStatus* is set to *notBroadcasting*:
 - 3> if onDemandSIB-Request is configured and timer T350 is not running:
 - 4> initiate transmission of the *DedicatedSIBRequest* message in accordance with 5.2.2.3.6;
 - 4> start timer T350 with the timer value set to the *onDemandSIB-RequestProhibitTimer*;
 - 4> acquire the requested SI message(s) corresponding to the requested posSIB(s) as defined in clause 5.2.2.3.2.

NOTE: UE may include on demand request for SIB and/or posSIB(s) in the same *DedicatedSIBRequest* message.

5.2.2.3.6 Actions related to transmission of *DedicatedSIBRequest* message

The UE shall set the contents of *DedicatedSIBRequest* message as follows:

- 1> if the procedure is triggered to request the required SIB(s):
 - 2> include requestedSIB-List in the onDemandSIB-RequestList to indicate the requested SIB(s);

- 1> if the procedure is triggered to request the required posSIB(s):
 - 2> include requestedPosSIB-List in the onDemandSIB-RequestList to indicate the requested posSIB(s).

The UE shall submit the *DedicatedSIBRequest* message to lower layers for transmission.

5.2.2.4 Actions upon receipt of System Information

5.2.2.4.1 Actions upon reception of the MIB

Upon receiving the MIB the UE shall:

- 1> store the acquired MIB;
- 1> if the UE is in RRC_IDLE or in RRC_INACTIVE, or if the UE is in RRC_CONNECTED while *T311* is running; and
- 1> if the access is not for NTN or the UE is not capable of NTN:
 - 2> if the *cellBarred* in the acquired *MIB* is set to *barred*:
 - 3> if the UE is a RedCap UE and *ssb-SubcarrierOffset* indicates *SIB1* is transmitted in the cell (TS 38.213 [13]):
 - 4> acquire the SIB1, which is scheduled as specified in TS 38.213 [13];
 - 3> consider the cell as barred in accordance with TS 38.304 [20];
 - 3> perform cell re-selection to other cells on the same frequency as the barred cell as specified in TS 38.304 [20];
 - 2> else:
 - 3> apply the received systemFrameNumber, pdcch-ConfigSIB1, subCarrierSpacingCommon, ssb-SubcarrierOffset and dmrs-TypeA-Position.

NOTE: A UE capable of NTN access should acquire SIB1 to determine whether the cell is an NTN cell.

5.2.2.4.2 Actions upon reception of the SIB1

Upon receiving the SIB1 the UE shall:

- 1> store the acquired *SIB1*;
- 1> if the UE is a RedCap UE and it is in RRC_IDLE or in RRC_INACTIVE, or if the RedCap UE is in RRC_CONNECTED while *T311* is running:
 - 2> if *intraFreqReselectionRedCap* is not present in *SIB1*:
 - 3> consider the cell as barred in accordance with TS 38.304 [20];
 - 3> perform barring as if intraFreqReselectionRedCap is set to allowed;
 - 2> else:
 - 3> if the *cellBarredRedCap1Rx* is present in the acquired *SIB1* and is set to *barred* and the UE is equipped with 1 Rx branch; or
 - 3> if the *cellBarredRedCap2Rx* is present in the acquired *SIB1* and is set to *barred* and the UE is equipped with 2 Rx branches; or
 - 3> if the *halfDuplexRedCapAllowed* is not present in the acquired *SIB1* and the UE supports only half-duplex FDD operation:
 - 4> consider the cell as barred in accordance with TS 38.304 [20];

- 4> perform barring based on intraFreqReselectionRedCap as specified in TS 38.304 [20];
- 1> if the *cellAccessRelatedInfo* contains an entry of a selected SNPN or PLMN and in case of PLMN the UE is either allowed or instructed to access the PLMN via a cell for which at least one CAG ID is broadcast:
 - 2> in the remainder of the procedures use *npn-IdentityList*, *trackingAreaCode*, and *cellIdentity* for the cell as received in the corresponding entry of *npn-IdentityInfoList* containing the selected PLMN or SNPN;
- 1> else if the cellAccessRelatedInfo contains an entry with the PLMN-Identity of the selected PLMN:
 - 2> in the remainder of the procedures use *plmn-IdentityList*, *trackingAreaCode*, *trackingAreaList*, and *cellIdentity* for the cell as received in the corresponding *PLMN-IdentityInfo* containing the selected PLMN;
- 1> if in RRC_CONNECTED while T311 is not running:
 - 2> disregard the *frequencyBandList*, if received, while in RRC_CONNECTED;
 - 2> forward the *cellIdentity* to upper layers;
 - 2> forward the *trackingAreaCode* to upper layers, if included;
 - 2> forward the *trackingAreaList* to upper layers, if included;
 - 2> forward the received *posSIB-MappingInfo* to upper layers, if included;
 - 2> apply the configuration included in the *servingCellConfigCommon*;
 - 2> if the UE has a stored valid version of a SIB or posSIB, in accordance with clause 5.2.2.2.1, that the UE requires to operate within the cell in accordance with clause 5.2.2.1:
 - 3> use the stored version of the required SIB or posSIB;
 - 2> else:
 - 3> acquire the required SIB or posSIB requested by upper layer as defined in clause 5.2.2.3.5;

NOTE: Void.

1> else:

- 2> if the UE supports one or more of the frequency bands indicated in the *frequencyBandList* for downlink for TDD, or one or more of the frequency bands indicated in the *frequencyBandList* for uplink for FDD, and they are not downlink only bands, and
- 2> if the UE is IAB-MT or supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* for a supported band in the downlink for TDD, or a supported band in uplink for FDD, and
- 2> if the UE supports an uplink channel bandwidth with a maximum transmission bandwidth configuration (see TS 38.101-1 [15] and TS 38.101-2 [39]) which
 - is smaller than or equal to the *carrierBandwidth* (indicated in *uplinkConfigCommon* for the SCS of the initial uplink BWP or, for RedCap UE, of the RedCap-specific initial uplink BWP if configured), and which
 - is wider than or equal to the bandwidth of the initial uplink BWP or, for RedCap UE, of the RedCap-specific initial uplink BWP if configured, and
- 2> if the UE supports a downlink channel bandwidth with a maximum transmission bandwidth configuration (see TS 38.101-1 [15] and TS 38.101-2 [39]) which
 - is smaller than or equal to the *carrierBandwidth* (indicated in *downlinkConfigCommon* for the SCS of the initial downlink BWP or, for RedCap UE, of the RedCap-specific initial downlink BWP if configured), and which
 - is wider than or equal to the bandwidth of the initial downlink BWP or, for RedCap UE, of the RedCapspecific initial downlink BWP if configured, and
- 2> if *frequencyShift7p5khz* is present and the UE supports corresponding 7.5kHz frequency shift on this band; or *frequencyShift7p5khz* is not present:

- 3> if neither *trackingAreaCode* nor *trackingAreaList* is provided for the selected PLMN nor the registered PLMN nor PLMN of the equivalent PLMN list:
 - 4> consider the cell as barred in accordance with TS 38.304 [20];
 - 4> perform cell re-selection to other cells on the same frequency as the barred cell as specified in TS 38.304 [20];
- 3> else if UE is IAB-MT and if *iab-Support* is not provided for the selected PLMN nor the registered PLMN nor PLMN of the equivalent PLMN list nor the selected SNPN nor the registered SNPN:
 - 4> consider the cell as barred for IAB-MT in accordance with TS 38.304 [20];

3> else:

- 4> apply a supported uplink channel bandwidth with a maximum transmission bandwidth which
 - is contained within the *carrierBandwidth* indicated in *uplinkConfigCommon* for the SCS of the initial uplink BWP or, for RedCap UEs, RedCap-specific initial uplink BWP, if configured, and which
 - is wider than or equal to the bandwidth of the initial BWP for the uplink or, for a RedCap UE, of the RedCap-specific initial uplink BWP if configured;
- 4> apply a supported downlink channel bandwidth with a maximum transmission bandwidth which
 - is contained within the carrierBandwidth indicated in downlinkConfigCommon for the SCS of the initial downlink BWP or, for RedCap UEs, RedCap-specific initial downlink BWP, if configured, and which
 - is wider than or equal to the bandwidth of the initial BWP for the downlink or, for a RedCap UE, of the RedCap-specific initial downlink BWP if configured;
- 4> select the first frequency band in the *frequencyBandList*, for FDD from *frequencyBandList* for uplink, or for TDD from *frequencyBandList* for downlink, which the UE supports and for which the UE supports at least one of the *additionalSpectrumEmission* values in *nr-NS-PmaxList*, if present;
- 4> forward the *cellIdentity* to upper layers;
- 4> forward the *trackingAreaCode* to upper layers;
- 4> forward the *trackingAreaList* to upper layers, if included;
- 4> forward the received posSIB-MappingInfo to upper layers, if included;
- 4> forward the PLMN identity or SNPN identity or PNI-NPN identity to upper layers;
- 4> if in RRC_INACTIVE and the forwarded information does not trigger message transmission by upper layers:
 - 5> if the serving cell does not belong to the configured ran-NotificationAreaInfo:
 - 6> initiate an RNA update as specified in 5.3.13.8;
- 4> forward the *ims-EmergencySupport* to upper layers, if present;
- 4> forward the *eCallOverIMS-Support* to upper layers, if present;
- 4> forward the *UAC-AccessCategory1-SelectionAssistanceInfo* or *UAC-AC1-SelectAssistInfo* for the selected PLMN/SNPN to upper layers, if present and set to *a*, *b* or *c*;
- 4> if the UE is in SNPN access mode:
 - 5> forward the *imsEmergencySupportForSNPN* indicators with the corresponding SNPN identities to upper layers, if present;
- 4> apply the configuration included in the *servingCellConfigCommon*;

- 4> apply the specified PCCH configuration defined in 9.1.1.3;
- 4> if the UE has a stored valid version of a SIB, in accordance with clause 5.2.2.2.1, that the UE requires to operate within the cell in accordance with clause 5.2.2.1:
 - 5> use the stored version of the required SIB;
- 4> if the UE has not stored a valid version of a SIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s), in accordance with clause 5.2.2.1:
 - 5> for the SI message(s) that, according to the *si-SchedulingInfo*, contain at least one required SIB and for which *si-BroadcastStatus* is set to broadcasting:
 - 6> acquire the SI message(s) as defined in clause 5.2.2.3.2;
 - 5> for the SI message(s) that, according to the *si-SchedulingInfo*, contain at least one required SIB and for which *si-BroadcastStatus* is set to *notBroadcasting*:
 - 6> trigger a request to acquire the SI message(s) as defined in clause 5.2.2.3.3;
- 4> if the UE has a stored valid version of a posSIB, in accordance with clause 5.2.2.2.1, of one or several required posSIB(s), in accordance with clause 5.2.2.1:
 - 5> use the stored version of the required posSIB;
- 4> if the UE has not stored a valid version of a posSIB, in accordance with clause 5.2.2.2.1, of one or several posSIB(s) in accordance with clause 5.2.2.1:
 - 5> for the SI message(s) that, according to the *posSI-SchedulingInfo*, contain at least one requested posSIB and for which *posSI-BroadcastStatus* is set to *broadcasting*:
 - 6> acquire the SI message(s) as defined in clause 5.2.2.3.2;
 - 5> for the SI message(s) that, according to the *posSI-SchedulingInfo*, contain at least one requested posSIB for which *posSI-BroadcastStatus* is set to *notBroadcasting*:
 - 6> trigger a request to acquire the SI message(s) as defined in clause 5.2.2.3.3a;
- 4> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NR-NS-PmaxList* within *frequencyBandList* in *uplinkConfigCommon* for FDD or in *downlinkConfigCommon* for TDD;
- 4> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NR-NS-PmaxList*:
 - 5> apply the *additionalPmax* for UL;
- 4> else:
 - 5> apply the *p-Max* in *uplinkConfigCommon* for UL;
- 4> if supplementaryUplink is present in servingCellConfigCommon; and
- 4> if the UE supports one or more of the frequency bands indicated in the *frequencyBandList* for the *supplementaryUplink*; and
- 4> if the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* for a supported supplementary uplink band; and
- 4> if the UE supports an uplink channel bandwidth with a maximum transmission bandwidth configuration (see TS 38.101-1 [15] and TS 38.101-2 [39]) which
 - is smaller than or equal to the *carrierBandwidth* (indicated in *supplementaryUplink* for the SCS of the initial uplink BWP), and which
 - is wider than or equal to the bandwidth of the initial uplink BWP of the SUL:

- 5> consider supplementary uplink as configured in the serving cell;
- 5> select the first frequency band in the *frequencyBandList* for the *supplementaryUplink* which the UE supports and for which the UE supports at least one of the *additionalSpectrumEmission* values in *nr-NS-PmaxList*, if present;
- 5> apply a supported supplementary uplink channel bandwidth with a maximum transmission bandwidth which
 - is contained within the *carrierBandwidth* (indicated in *supplementaryUplink* for the SCS of the initial uplink BWP), and which
 - is wider than or equal to the bandwidth of the initial BWP of the SUL;
- 5> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NR-NS-PmaxList* within *frequencyBandList* for the *supplementaryUplink*;
- 5> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NR-NS-PmaxList* for the *supplementaryUplink*:
 - 6> apply the additionalPmax in supplementaryUplink for SUL;
- 5> else:
 - 6> apply the *p-Max* in *supplementaryUplink* for SUL;

2> else:

- 3> consider the cell as barred in accordance with TS 38.304 [20]; and
- 3> perform barring as if *intraFreqReselection*, or *intraFreqReselectionRedCap* for RedCap UEs, is set to *notAllowed*;

5.2.2.4.3 Actions upon reception of *SIB2*

Upon receiving SIB2, the UE shall:

- 1> if in RRC_IDLE or in RRC_INACTIVE or in RRC_CONNECTED while T311 is running:
 - 2> if, for the entry in *frequencyBandList* with the same index as the frequency band selected in clause 5.2.2.4.2, the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* within the *frequencyBandList*:
 - 3> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NR-NS-PmaxList* within *frequencyBandList*;
 - 3> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NR-NS-PmaxList*:
 - 4> apply the additionalPmax;
 - 3> else:
 - 4> apply the *p-Max*;
 - 3> if the UE selects a frequency band (from the procedure in clause 5.2.2.4.2) for the supplementary uplink:
 - 4> if, for the entry in *frequencyBandListSUL* with the same index as the frequency band selected in clause 5.2.2.4.2, the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* within the *frequencyBandListSUL*:
 - 5> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NR-NS-PmaxList* within *frequencyBandListSUL*;
 - 5> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NR-NS-PmaxList*:

6> apply the additionalPmax;

5> else:

6> apply the *p-Max*;

4> else:

5> apply the *p-Max*.

2> else:

3> apply the p-Max;

5.2.2.4.4 Actions upon reception of SIB3

No UE requirements related to the contents of this *SIB3* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.4.5 Actions upon reception of SIB4

Upon receiving SIB4 the UE shall:

- 1> if in RRC IDLE, or in RRC INACTIVE or in RRC CONNECTED while T311 is running:
 - 2> for each entry in the interFreqCarrierFreqList:
 - 3> if the UE is not a RedCap UE; or
 - 3> if the UE is a RedCap UE and the interFreqCarrierFreqList-v1700 is absent; or
 - 3> if the UE is a RedCap UE and redCapAccessAllowed is present in interFreqCarrierFreqList-v1700:
 - 4> select the first frequency band in the *frequencyBandList*, and *frequencyBandListSUL*, if present, which the UE supports and for which the UE supports at least one of the *additionalSpectrumEmission* values in *NR-NS-PmaxList*, if present:
 - 4> if, the frequency band selected by the UE in *frequencyBandList* to represent a non-serving NR carrier frequency is not a downlink only band:
 - 5> if, for the selected frequency band, the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* within the *frequencyBandList*:
 - 6> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NR-NS-PmaxList* within *frequencyBandList*;
 - 6> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NR-NS-PmaxList*:

7> apply the additionalPmax;

6> else:

7> apply the *p-Max*;

- 6> if frequencyBandListSUL is present in SIB4 and, for the frequency band selected in frequencyBandListSUL, the UE supports at least one additionalSpectrumEmission in the NR-NS-PmaxList within FrequencyBandListSUL:
 - 7> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NR-NS-PmaxList* within *frequencyBandListSUL*;
 - 7> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NR-NS-PmaxList*:
 - 8> apply the *additionalPmax*;

7> else:

8> apply the *p-Max*;

6> else:

7> apply the *p-Max*;

5> else:

6 > apply the p-Max;

- 1> if in RRC_IDLE or RRC_INACTIVE, and T331 is running:
 - 2> perform the actions as specified in 5.7.8.1a;

5.2.2.4.6 Actions upon reception of *SIB5*

No UE requirements related to the contents of this *SIB5* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.4.7 Actions upon reception of SIB6

Upon receiving the SIB6 the UE shall:

1> forward the received *warningType*, *messageIdentifier* and *serialNumber* to upper layers;

5.2.2.4.8 Actions upon reception of SIB7

Upon receiving the SIB7 the UE shall:

- 1> if there is no current value for messageIdentifier and serialNumber for SIB7; or
- 1> if either the received value of *messageIdentifier* or of serialNumber, or of both *messageIdentifier* and serialNumber are different from the current values of *messageIdentifier* and serialNumber for SIB7:
 - 2> use the received values of *messageIdentifier* and *serialNumber* for *SIB7* as the current values of *messageIdentifier* and *serialNumber* for *SIB7*;
 - 2> discard any previously buffered warningMessageSegment;
 - 2> if all segments of a warning message have been received:
 - 3> assemble the warning message from the received warningMessageSegment(s);
 - 3> forward the received warning message, *messageIdentifier*, *serialNumber* and *dataCodingScheme* to upper layers;
 - 3> stop reception of SIB7;
 - 3> discard the current values of messageIdentifier and serialNumber for SIB7;
 - 2> else:
 - 3> store the received warningMessageSegment;
 - 3> continue reception of SIB7;
- 1> else if all segments of a warning message have been received:
 - 2> assemble the warning message from the received warningMessageSegment(s);
 - 2> forward the received complete warning message, *messageIdentifier*, *serialNumber* and *dataCodingScheme* to upper layers;
 - 2> stop reception of SIB7;

- 2> discard the current values of *messageIdentifier* and *serialNumber* for *SIB7*;
- 1> else:
 - 2> store the received warningMessageSegment;
 - 2> continue reception of SIB7;

The UE should discard any stored *warningMessageSegment* and the current value of *messageIdentifier* and *serialNumber* for *SIB7* if the complete warning message has not been assembled within a period of 3 hours.

5.2.2.4.9 Actions upon reception of SIB8

Upon receiving the SIB8 the UE shall:

- 1> if the SIB8 contains a complete warning message and the complete geographical area coordinates (if any):
 - 2> forward the received warning message, *messageIdentifier*, *serialNumber*, *dataCodingScheme* and the geographical area coordinates (if any) to upper layers;
 - 2> continue reception of SIB8;

1> else:

- 2> if the received values of *messageIdentifier* and *serialNumber* are the same (each value is the same) as a pair for which a warning message and the geographical area coordinates (if any) are currently being assembled:
 - 3> store the received warningMessageSegment;
 - 3> store the received warningAreaCoordinatesSegment (if any);
 - 3> if all segments of a warning message and geographical area coordinates (if any) have been received:
 - 4> assemble the warning message from the received warningMessageSegment;
 - 4> assemble the geographical area coordinates from the received warningAreaCoordinatesSegment (if any);
 - 4> forward the received warning message, *messageIdentifier*, *serialNumber*, *dataCodingScheme* and geographical area coordinates (if any) to upper layers;
 - 4> stop assembling a warning message and geographical area coordinates (if any) for this *messageIdentifier* and *serialNumber* and delete all stored information held for it;
 - 3> continue reception of SIB8;
- 2> else if the received values of *messageIdentifier* and/or *serialNumber* are not the same as any of the pairs for which a warning message is currently being assembled:
 - 3> start assembling a warning message for this messageIdentifier and serialNumber pair;
 - 3> start assembling the geographical area coordinates (if any) for this *messageIdentifier* and *serialNumber* pair;
 - 3> store the received warningMessageSegment;
 - 3> store the received warningAreaCoordinatesSegment (if any);
 - 3> continue reception of SIB8;

The UE should discard *warningMessageSegment* and *warningAreaCoordinatesSegment* (if any) and the associated values of *messageIdentifier* and *serialNumber* for *SIB8* if the complete warning message and the geographical area coordinates (if any) have not been assembled within a period of 3 hours.

NOTE: The number of warning messages that a UE can re-assemble simultaneously is a function of UE implementation.

5.2.2.4.10 Actions upon reception of SIB9

Upon receiving SIB9 with referenceTimeInfo, the UE may perform the related actions except for the action of ignoring all further referenceTimeInfo received in SIB9 as specified in clause 5.7.1.3.

5.2.2.4.11 Actions upon reception of *SIB10*

Upon receiving SIB10, the UE shall:

1> Forward the *HRNN-list* entries with the corresponding PNI-NPN and SNPN identities to upper layers;

5.2.2.4.12 Actions upon reception of *SIB11*

Upon receiving SIB11, the UE shall:

- 1> if in RRC_IDLE or RRC_INACTIVE, and T331 is running:
 - 2> perform the actions as specified in 5.7.8.1a;

5.2.2.4.13 Actions upon reception of SIB12

Upon receiving SIB12, the UE shall:

- 1> if the UE has stored at least one segment of SIB12 and the value tag of SIB12 has changed since a previous segment was stored:
 - 2> discard all stored segments;
- 1> store the segment;
- 1> if all segments have been received:
 - 2> assemble SIB12-IEs from the received segments;
 - 2> if *sl-FreqInfoList* is included in *sl-ConfigCommonNR*:
 - 3> if configured to receive NR sidelink communication:
 - 4> use the resource pool(s) indicated by *sl-RxPool* for NR sidelink communication reception, as specified in 5.8.7;
 - 3> if configured to transmit NR sidelink communication:
 - 4> use the resource pool(s) indicated by *sl-TxPoolSelectedNormal*, or *sl-TxPoolExceptional* for NR sidelink communication transmission, as specified in 5.8.8;
 - 4> perform CBR measurement on the transmission resource pool(s) indicated by sl-TxPoolSelectedNormal or sl-TxPoolExceptional for NR sidelink communication transmission, as specified in 5.5.3.1;
 - 4> use the synchronization configuration parameters for NR sidelink communication on frequencies included in *sl-FreqInfoList*, as specified in 5.8.5;
 - 3> if configured to receive NR sidelink discovery:
 - 4> use the resource pool(s) indicated by *sl-DiscRxPool* or *sl-RxPool* for NR sidelink discovery reception, as specified in 5.8.13.2;
 - 3> if configured to transmit NR sidelink discovery:
 - 4> use the resource pool(s) indicated by *sl-DiscTxPoolSelected*, *sl-TxPoolExceptional* or *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission, as specified in 5.8.13.3;
 - 4> perform CBR measurement on the transmission resource pool(s) indicated by *sl-TxPoolSelectedNormal*, *sl-DiscTxPoolSelected* or *sl-TxPoolExceptional* for NR sidelink discovery transmission, as specified in 5.5.3.1;

- 4> use the synchronization configuration parameters for NR sidelink discovery on frequencies included in *sl-FreqInfoList*, as specified in 5.8.5;
- 2> if sl-RadioBearerConfigList or sl-RLC-BearerConfigList is included in sl-ConfigCommonNR:
 - 3> perform sidelink DRB addition/modification/release as specified in 5.8.9.1a.1/5.8.9.1a.2;
- 2> if *sl-MeasConfigCommon* is included in *sl-ConfigCommonNR*:
 - 3> store the NR sidelink measurement configuration.
- 2> if sl-DRX-ConfigCommonGC-BC is included in SIB12-IEs:
 - 3> store the NR sidelink DRX configuration and configure lower layers to perform sidelink DRX operation for groupcast and broadcast as specified in TS 38.321 [3].
- 1> if the UE is acting as L2 U2N Remote UE:
 - 2> if the *ue-TimersAndConstantsRemoteUE* is included in *SIB12*:
 - 3> use values for timers T300, T301 and T319 as included in the *ue-TimersAndConstantsRemoteUE* received in *SIB12*;
 - 2> else:
 - 3> use values for timers T300, T301 and T319 as included in the ue-TimersAndConstants received in SIB1;

The UE should discard any stored segments for *SIB12* if the complete *SIB12* has not been assembled within a period of 3 hours. The UE shall discard any stored segments for *SIB12* upon cell (re-)selection.

5.2.2.4.14 Actions upon reception of *SIB13*

Upon receiving *SIB13*, the UE shall perform the actions upon reception of *SystemInformationBlockType21* as specified in 5.2.2.28 in TS 36.331 [10].

5.2.2.4.15 Actions upon reception of SIB14

Upon receiving *SIB14*, the UE shall perform the actions upon reception of *SystemInformationBlockType26* as specified in 5.2.2.33 in TS 36.331 [10].

5.2.2.4.16 Actions upon reception of *SIBpos*

No UE requirements related to the contents of the *SIBpos* apply other than those specified elsewhere e.g. within TS 37.355 [49], and/or within the corresponding field descriptions.

5.2.2.4.17 Actions upon reception of *SIB15*

Upon receiving SIB15, the UE shall:

1> forward the applicable disaster roaming information for each PLMN sharing the cell to upper layers.

5.2.2.4.18 Actions upon reception of *SIB16*

Upon receiving *SIB16* with cell reselection priorities for slicing, the UE shall perform the actions as specified in TS 38.304 [20].

5.2.2.4.19 Actions upon reception of *SIB17*

Upon receiving SIB17, the UE shall:

- 1> if the UE has stored at least one segment of *SIB17* and the value tag of *SIB17* has changed since a previous segment was stored:
 - 2> discard all stored segments;

- 1> store the segment;
- 1> if all segments have been received:
 - 2> assemble SIB17-IEs from the received segments.

The UE should discard any stored segments for *SIB17* if the complete *SIB17* has not been assembled within a period of 3 hours. The UE shall discard any stored segments for *SIB17* upon cell (re-) selection.

5.2.2.4.20 Actions upon reception of SIB18

Upon receiving SIB18, the UE shall:

1> forward the Group IDs for Network selection (GINs) in *SIB18* with the corresponding SNPN identities to upper layers;

5.2.2.4.21 Actions upon reception of SIB19

Upon receiving SIB19, the UE in RRC_CONNECTED shall:

1> start or restart T430 for serving cell with the timer value set to *ntn-UlSyncValidityDuration* for the serving cell from the subframe indicated by *epochTime* for the serving cell;

NOTE: UE should attempt to re-acquire *SIB19* before the end of the duration indicated by *ntn-UlSyncValidityDuration* and *epochTime* by UE implementation.

5.2.2.4.22 Actions upon reception of *SIB20*

No UE requirements related to the contents of *SIB20* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/or within the corresponding field descriptions.

5.2.2.4.23 Actions upon reception of SIB21

No UE requirements related to the contents of *SIB21* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/or within the corresponding field descriptions.

5.2.2.5 Essential system information missing

The UE shall:

- 1> if in RRC_IDLE or in RRC_INACTIVE or in RRC_CONNECTED while T311 is running:
 - 2> if the UE is unable to acquire the MIB:
 - 3> consider the cell as barred in accordance with TS 38.304 [20];
 - 3> perform barring as if *intraFreqReselection*, or *intraFreqReselectionRedCap* for RedCap UEs, is set to *allowed*;
 - 2> else if the UE is unable to acquire the SIB1:
 - 3> consider the cell as barred in accordance with TS 38.304 [20];
 - 3> if the UE is a RedCap UE:
 - 4> perform barring as if *intraFreqReselectionRedCap* is set to *allowed*;
 - 3> else:
 - 4> perform cell re-selection to other cells on the same frequency as the barred cell as specified in TS 38.304 [20].

5.2.2.6 T430 expiry

The UE shall:

- 1> if T430 for serving cell expires and if in RRC_CONNECTED:
 - 2> inform lower layers that UL synchronisation is lost;
 - 2> acquire SIB19 as defined in clause 5.2.2.3.2;
 - 2> upon successful acquisition of SIB19:
 - 3> inform lower layers when UL synchronisation is obtained;

NOTE: The exact time when UL synchronisation is obtained (after SIB19 is acquired) is left to UE implementation, which can be from the subframe indicated by *epochTime* and optionally before the subframe indicated by *epochTime*.

5.3 Connection control

5.3.1 Introduction

5.3.1.1 RRC connection control

RRC connection establishment involves the establishment of SRB1. The network completes RRC connection establishment prior to completing the establishment of the NG connection, i.e. prior to receiving the UE context information from the 5GC. Consequently, AS security is not activated during the initial phase of the RRC connection. During this initial phase of the RRC connection, the network may configure the UE to perform measurement reporting, but the UE only sends the corresponding measurement reports after successful AS security activation. However, the UE only accepts a re-configuration with sync message when AS security has been activated.

Upon receiving the UE context from the 5GC, the RAN activates AS security (both ciphering and integrity protection) using the initial AS security activation procedure. The RRC messages to activate AS security (command and successful response) are integrity protected, while ciphering is started only after completion of the procedure. That is, the response to the message used to activate AS security is not ciphered, while the subsequent messages (e.g. used to establish SRB2, DRBs and multicast MRBs) are both integrity protected and ciphered. After having initiated the initial AS security activation procedure, the network may initiate the establishment of SRB2 and DRBs and/or multicast MRBs, i.e. the network may do this prior to receiving the confirmation of the initial AS security activation from the UE. In any case, the network will apply both ciphering and integrity protection for the RRC reconfiguration messages used to establish SRB2, DRBs and/or multicast MRBs. The network should release the RRC connection if the initial AS security activation and/ or the radio bearer establishment fails. A configuration with SRB2 without DRB or multicast MRB, or with DRB or multicast MRB without SRB2 is not supported (i.e., SRB2 and at least one DRB or multicast MRB must be configured in the same RRC Reconfiguration message, and it is not allowed to release all the DRBs and multicast MRBs without releasing the RRC Connection). For IAB-MT, a configuration with SRB2 without any DRB/MRB is supported.

The release of the RRC connection normally is initiated by the network. The procedure may be used to re-direct the UE to an NR frequency or an E-UTRA carrier frequency.

The suspension of the RRC connection is initiated by the network. When the RRC connection is suspended, the UE stores the UE Inactive AS context and any configuration received from the network, and transits to RRC_INACTIVE state. The RRC message to suspend the RRC connection is integrity protected and ciphered.

The resumption of a suspended RRC connection is initiated by upper layers when the UE needs to transit from RRC_INACTIVE state to RRC_CONNECTED state or by RRC layer to perform a RNA update or by RAN paging from NG-RAN or for SDT. When the RRC connection is resumed, network configures the UE according to the RRC connection resume procedure based on the stored UE Inactive AS context and any RRC configuration received from the network. The RRC connection resume procedure re-activates AS security and re-establishes SRB(s) and DRB(s) and/or multicast MRB(s), if configured.

Upon initiating the resume procedure for SDT, AS security (both ciphering and integrity protection) is re-activated for SRB2 (if configured for SDT) and for SRB1. In addition, AS security is also re-activated (if security is configured) for

all the DRBs configured for SDT. Further, the PDCP entities of SRB1 and PDCP entities of the radio bearers configured for SDT are re-established and resumed whilst the UE remains in RRC_INACTIVE state. Transmission and reception of data and/or signalling messages over radio bearers configured for SDT can happen whilst the UE is in RRC_INACTIVE state and SDT procedure is ongoing.

In response to a request to resume the RRC connection or in response to a resume procedure initiated for SDT, the network may resume the suspended RRC connection and send UE to RRC_CONNECTED, or reject the request to resume and send UE to RRC_INACTIVE (with a wait timer), or directly re-suspend the RRC connection and send UE to RRC_INACTIVE, or directly release the RRC connection and send UE to RRC_IDLE, or instruct the UE to initiate NAS level recovery (in this case the network sends an RRC setup message).

NOTE: In case the UE receives the configurations for NR sidelink communication via the E-UTRA, the configurations for NR sidelink communication in *SIB12* and *sl-ConfigDedicatedNR* within *RRCReconfiguration* used in clause 5.3 are provided by the configurations in *SystemInformationBlockType28* and *sl-ConfigDedicatedForNR* within *RRCConnectionReconfiguration* as specified in TS 36.331[10], respectively.

5.3.1.2 AS Security

AS security comprises of the integrity protection and ciphering of RRC signalling (SRBs) and user data (DRBs).

RRC handles the configuration of the AS security parameters which are part of the AS configuration: the integrity protection algorithm, the ciphering algorithm, if integrity protection and/or ciphering is enabled for a DRB and two parameters, namely the <code>keySetChangeIndicator</code> and the <code>nextHopChainingCount</code>, which are used by the UE to determine the AS security keys upon reconfiguration with sync (with key change), connection re-establishment and/or connection resume.

The integrity protection algorithm is common for SRB1, SRB2, SRB3 (if configured), SRB4 (if configured) and DRBs configured with integrity protection, with the same *keyToUse* value. The ciphering algorithm is common for SRB1, SRB2, SRB3 (if configured), SRB4 (if configured) and DRBs configured with the same *keyToUse* value. Neither integrity protection nor ciphering applies for SRB0.

NOTE 0: All DRBs related to the same PDU session have the same enable/disable setting for ciphering and the same enable/disable setting for integrity protection, as specified in TS 33.501 [11].

RRC integrity protection and ciphering are always activated together, i.e. in one message/procedure. RRC integrity protection and ciphering for SRBs are never de-activated. However, it is possible to switch to a 'NULL' ciphering algorithm (nea0).

The 'NULL' integrity protection algorithm (nia0) is used only for SRBs and for the UE in limited service mode, see TS 33.501 [11] and when used for SRBs, integrity protection is disabled for DRBs. In case the 'NULL' integrity protection algorithm is used, 'NULL' ciphering algorithm is also used.

NOTE 1: Lower layers discard RRC messages for which the integrity protection check has failed and indicate the integrity protection verification check failure to RRC.

The AS applies four different security keys: one for the integrity protection of RRC signalling (K_{RRCint}), one for the ciphering of RRC signalling (K_{RRCenc}), one for integrity protection of user data (K_{UPenc}) and one for the ciphering of user data (K_{UPenc}). All four AS keys are derived from the K_{gNB} key. The K_{gNB} key is based on the K_{AMF} key (as specified in TS 33.501 [11]), which is handled by upper layers.

The integrity protection and ciphering algorithms can only be changed with reconfiguration with sync. The AS keys $(K_{gNB}, K_{RRCint}, K_{RRCenc}, K_{UPint})$ and K_{UPenc} change upon reconfiguration with sync (if *masterKeyUpdate* is included), and upon connection re-establishment and connection resume.

For each radio bearer an independent counter (*COUNT*, as specified in TS 38.323 [5]) is maintained for each direction. For each radio bearer, the *COUNT* is used as input for ciphering and integrity protection.

It is not allowed to use the same *COUNT* value more than once for a given security key. As specified in TS 33.501 clause 6.9.4.1 [11], the network is responsible for avoiding reuse of the *COUNT* with the same RB identity and with the same key, e.g. due to the transfer of large volumes of data, release and establishment of new RBs, and multiple termination point changes for RLC-UM bearers and multiple termination point changes for RLC-AM bearer with SN terminated PDCP re-establishment (COUNT reset) due to SN only full configuration whilst the key stream inputs (i.e. bearer ID, security key) at MN have not been updated. In order to avoid such re-use, the network may e.g. use different

RB identities for RB establishments, change the AS security key, or an RRC_CONNECTED to RRC_IDLE/RRC_INACTIVE and then to RRC_CONNECTED transition.

In order to limit the signalling overhead, individual messages/ packets include a short sequence number (PDCP SN, as specified in TS 38.323 [5]). In addition, an overflow counter mechanism is used: the hyper frame number (*HFN*, as specified in TS 38.323 [5]). The HFN needs to be synchronized between the UE and the network.

For each SRB, the value provided by RRC to lower layers to derive the 5-bit BEARER parameter used as input for ciphering and for integrity protection is the value of the corresponding *srb-Identity* with the MSBs padded with zeroes.

For a UE provided with an sk-counter, keyToUse indicates whether the UE uses the master key (K_{gNB}) or the secondary key (S- K_{eNB} or S- K_{gNB}) for a particular DRB. The secondary key is derived from the master key and sk-Counter, as defined in TS 33.501[11]. Whenever there is a need to refresh the secondary key, e.g. upon change of MN with K_{gNB} change or to avoid COUNT reuse, the security key update is used (see 5.3.5.7). When the UE is in NR-DC, the network may provide a UE configured with an sk-Counter even when no DRB is setup using the secondary key (S- K_{gNB}) in order to allow the configuration of SRB3. The network can also provide the UE with an sk-Counter, even if no SCG is configured, when using SN terminated SN MCG bearers.

5.3.2 Paging

5.3.2.1 General

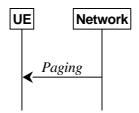


Figure 5.3.2.1-1: Paging

The purpose of this procedure is:

- to transmit paging information to a UE in RRC_IDLE or RRC_INACTIVE.
- to transmit paging information for a L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE to its serving L2 U2N Relay UE in any RRC state.

5.3.2.2 Initiation

The network initiates the paging procedure by transmitting the *Paging* message at the UE's paging occasion as specified in TS 38.304 [20]. The network may address multiple UEs within a *Paging* message by including one *PagingRecord* for each UE. The network may also include one or multiple TMGI(s) in the Paging message to page UEs for specific MBS multicast session(s).

5.3.2.3 Reception of the *Paging message* by the UE or *PagingRecord* by the L2 U2N Remote UE

Upon receiving the *Paging* message by the UE or receiving *PagingRecord* from its connected L2 U2N Relay UE by a L2 U2N Remote UE, the UE shall:

- 1> if in RRC_IDLE, for each of the PagingRecord, if any, included in the Paging message, or
- 1> if in RRC_IDLE, for each of the *PagingRecord*, if any, included in the *UuMessageTransferSidelink* message received from the connected L2 U2N Relay UE:
 - 2> if the *ue-Identity* included in the *PagingRecord* matches the UE identity allocated by upper layers:
 - 3> if upper layers indicate the support of paging cause:
 - 4> forward the *ue-Identity*, *accessType* (if present) and paging cause (if determined) to the upper layers;

- 3> else:
 - 4> forward the *ue-Identity* and *accessType* (if present) to the upper layers;
- 1> if in RRC_INACTIVE, for each of the PagingRecord, if any, included in the Paging message, or
- 1> if in RRC_INACTIVE, for each of the *PagingRecord*, if any, included in the *UuMessageTransferSidelink* message received from the connected L2 U2N Relay UE:
 - 2> if the *ue-Identity* included in the *PagingRecord* matches the UE's stored *fullI-RNTI*:
 - 3> if the UE is configured by upper layers with Access Identity 1:
 - 4> initiate the RRC connection resumption procedure according to 5.3.13 with *resumeCause* set to *mps- PriorityAccess*;
 - 3> else if the UE is configured by upper layers with Access Identity 2:
 - 4> initiate the RRC connection resumption procedure according to 5.3.13 with *resumeCause* set to *mcs-PriorityAccess*;
 - 3> else if the UE is configured by upper layers with one or more Access Identities equal to 11-15:
 - 4> initiate the RRC connection resumption procedure according to 5.3.13 with *resumeCause* set to *highPriorityAccess*;
 - 3> else:
 - 4> initiate the RRC connection resumption procedure according to 5.3.13 with *resumeCause* set to *mt*-*Access*;
- NOTE: A MUSIM UE may not initiate the RRC connection resumption procedure, e.g. when it decides not to respond to the *Paging* message due to UE implementation constraints as specified in TS 24.501 [23].
 - 2> else if the *ue-Identity* included in the *PagingRecord* matches the UE identity allocated by upper layers:
 - 3> if upper layers indicate the support of paging cause:
 - 4> forward the *ue-Identity*, *accessType* (if present) and paging cause (if determined) to the upper layers;
 - 3> else:
 - 4> forward the *ue-Identity* and *accessType* (if present) to the upper layers;
 - 3> perform the actions upon going to RRC_IDLE as specified in 5.3.11 with release cause 'other';
- 1> if in RRC_IDLE, for each TMGI included in pagingGroupList, if any, included in the Paging message:
 - 2> if the UE has joined an MBS session indicated by the TMGI included in the paging Group List:
 - 3> forward the *TMGI* to the upper layers;
- 1> if in RRC_INACTIVE and the UE has joined one or more MBS session(s) indicated by the *TMGI*(s) included in the *pagingGroupList*:
 - 2> if none of the *ue-Identity* included in any of the *PagingRecord*, if included in the *Paging* message, matches the UE identity allocated by upper layers:
 - 3> initiate the RRC connection resumption procedure according to 5.3.13 with resumeCause set as below:
 - 4> if the UE is configured by upper layers with Access Identity 1:
 - 5> resumeCause is set to mps-PriorityAccess;
 - 4> else if the UE is configured by upper layers with Access Identity 2:
 - 5> resumeCause is set to mcs-PriorityAccess;

- 4> else if the UE is configured by upper layers with one or more Access Identities equal to 11-15:
 - 5> resumeCause is set to highPriorityAccess;
- 4> else:
 - 5> resumeCause is set to mt-Access;
- 2> else:
 - 3> forward the TMGI(s) to the upper layers;
- 1> if the UE is acting as a L2 U2N Relay UE, for each of the *PagingRecord*, if any, included in the *Paging* message:
 - 2> if the *ue-Identity* included in the *PagingRecord* in the *Paging* message matches the UE identity in *sl-PagingIdentityRemoteUE* included in *sl-PagingInfo-RemoteUE* received in *RemoteUEInformationSidelink* message from a L2 U2N Remote UE:
 - 3> inititate the Uu Message transfer in sidelink to that UE as specified in 5.8.9.9;

5.3.3 RRC connection establishment

5.3.3.1 General

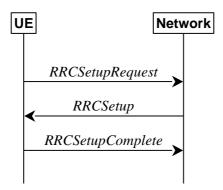


Figure 5.3.3.1-1: RRC connection establishment, successful

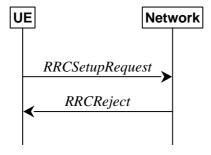


Figure 5.3.3.1-2: RRC connection establishment, network reject

The purpose of this procedure is to establish an RRC connection. RRC connection establishment involves SRB1 establishment. The procedure is also used to transfer the initial NAS dedicated information/ message from the UE to the network.

The network applies the procedure e.g.as follows:

- When establishing an RRC connection;
- When UE is resuming or re-establishing an RRC connection, and the network is not able to retrieve or verify the UE context. In this case, UE receives *RRCSetup* and responds with *RRCSetupComplete*.

5.3.3.1a Conditions for establishing RRC Connection for NR sidelink communication/discovery/V2X sidelink communication

For NR sidelink communication/discovery, an RRC connection establishment is initiated only in the following cases:

- 1> if configured by upper layers to transmit NR sidelink communication/discovery and related data is available for transmission:
 - 2> if the frequency on which the UE is configured to transmit NR sidelink communication is included in *sl-FreqInfoList* within *SIB12* provided by the cell on which the UE camps; and if the valid version of *SIB12* does not include *sl-TxPoolSelectedNormal* for the concerned frequency; or
 - 2> if the frequency on which the UE is configured to transmit NR sidelink discovery is included in *sl-FreqInfoList* within *SIB12* provided by the cell on which the UE camps; and if the valid version of *SIB12* does not include *sl-DiscTxPoolSelected* or *sl-TxPoolSelectedNormal* for the concerned frequency;

For L2 U2N Relay UE in RRC_IDLE, an RRC connection establishment is initiated in the following cases:

1> if any message is received from a L2 U2N Remote UE via SL-RLC0 as specified in 9.1.1.4 or SL-RLC1 as specified in 9.2.4;

For V2X sidelink communication, an RRC connection is initiated only when the conditions specified for V2X sidelink communication in clause 5.3.3.1a of TS 36.331 [10] are met.

NOTE: Upper layers initiate an RRC connection (except if the RRC connection is initiated at the L2 U2N Relay UE upon reception of a message from a L2 U2N Remote UE via SL-RLC0 or SL-RLC1). The interaction with NAS is left to UE implementation.

5.3.3.2 Initiation

The UE initiates the procedure when upper layers request establishment of an RRC connection while the UE is in RRC_IDLE and it has acquired essential system information, or for sidelink communication as specified in clause 5.3.3.1a.

The UE shall ensure having valid and up to date essential system information as specified in clause 5.2.2.2 before initiating this procedure.

Upon initiation of the procedure, the UE shall:

- 1> if the upper layers provide an Access Category and one or more Access Identities upon requesting establishment of an RRC connection:
 - 2> perform the unified access control procedure as specified in 5.3.14 using the Access Category and Access Identities provided by upper layers;
 - 3> if the access attempt is barred, the procedure ends;
- 1> if the upper layers provide NSAG information and one or more S-NSSAI(s) triggering the access attempt (TS 23.501 [32] and TS 24.501 [23]):
 - 2> apply the NSAG with highest NSAG priority among the NSAGs that are included in *SIB1* (i.e., in *FeatureCombination* and in *RA-PrioritizationSliceInfo*), and that are associated with the S-NSSAI(s) triggering the access attempt, in the Random Access procedure (TS 38.321 [3], clause 5.1);
- 1> if the UE is acting as L2 U2N Remote UE:
 - 2> establish a SRAP entity as specified in TS 38.351 [66], if no SRAP entity has been established;
 - 2> apply the specified configuration of SL-RLC0 as specified in 9.1.1.4;
 - 2> apply the SDAP configuration and PDCP configuration as specified in 9.1.1.2 for SRB0;

1> else:

2> apply the default L1 parameter values as specified in corresponding physical layer specifications except for the parameters for which values are provided in *SIB1*;

- 2> apply the default MAC Cell Group configuration as specified in 9.2.2;
- 2> apply the CCCH configuration as specified in 9.1.1.2;
- 2> apply the *timeAlignmentTimerCommon* included in *SIB1*;
- 1> start timer T300;
- 1> initiate transmission of the RRCSetupRequest message in accordance with 5.3.3.3;

5.3.3.3 Actions related to transmission of *RRCSetupRequest* message

The UE shall set the contents of RRCSetupRequest message as follows:

- 1> set the *ue-Identity* as follows:
 - 2> if upper layers provide a 5G-S-TMSI:
 - 3> set the *ue-Identity* to *ng-5G-S-TMSI-Part1*;
 - 2> else:
 - 3> draw a 39-bit random value in the range $0..2^{39}$ -1 and set the *ue-Identity* to this value;
- NOTE 1: Upper layers provide the 5G-S-TMSI if the UE is registered in the TA of the current cell.
- 1> if the establishment of the RRC connection is the result of release with redirect with *mpsPriorityIndication* (either in NR or E-UTRAN):
 - 2> set the *establishmentCause* to *mps-PriorityAccess*;
- 1> else:
 - 2> set the establishmentCause in accordance with the information received from upper layers;
- NOTE 2: In case the L2 U2N Relay UE initiates RRC connection establishment triggered by reception of message from a L2 U2N Remote UE via SL-RLC0 or SL-RLC1 as specified in 5.3.3.1a, the L2 U2N Relay UE sets the *establishmentCause* by implementation, but it can only set the *emergency*, *mps-PriorityAccess*, or *mcs-PriorityAccess* as *establishmentCause* if the same cause value is in the message received from the L2 U2N Remote UE via SL-RLC0.
- 1> if ta-Report is configured with value enabled and the UE supports TA reporting:
 - 2> indicate TA report initiation to lower layers;

The UE shall submit the RRCSetupRequest message to lower layers for transmission.

If the UE is a RedCap UE and the RedCap-specific initial downlink BWP is not associated with CD-SSB, the UE may continue cell re-selection related measurements as well as cell re-selection evaluation, otherwise the UE shall continue cell re-selection related measurements as well as cell re-selection evaluation. If the conditions for cell re-selection are fulfilled, the UE shall perform cell re-selection as specified in 5.3.3.6.

NOTE 3: For L2 U2N Remote UE in RRC_IDLE, the cell (re)selection procedure as specified in TS 38.304 [20] and relay (re)selection procedure as specified in 5.8.15.3 are performed independently and up to UE implementation to select either a cell or a L2 U2N Relay UE.

5.3.3.4 Reception of the *RRCSetup* by the UE

The UE shall perform the following actions upon reception of the *RRCSetup*:

- 1> if the RRCSetup is received in response to an RRCReestablishmentRequest; or
- 1> if the RRCSetup is received in response to an RRCResumeRequest or RRCResumeRequest1:
 - 2> if *sdt-MAC-PHY-CG-Config* is configured:

- 3> instruct the MAC entity to stop the *cg-SDT-TimeAlignmentTimer*, if it is running;
- 3> instruct the MAC entity to start the timeAlignmentTimer associated with the PTAG, if it is not running;
- 2> if *srs-PosRRC-InactiveConfig* is configured:
 - 3> instruct the MAC entity to stop the *inactivePosSRS-TimeAlignmentTimer*, if it is running;
- 2> discard any stored UE Inactive AS context and *suspendConfig*;
- 2> discard any current AS security context including the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key;
- 2> release radio resources for all established RBs except SRB0 and broadcast MRBs, including release of the RLC entities, of the associated PDCP entities and of SDAP;
- 2> release the RRC configuration except for the default L1 parameter values, default MAC Cell Group configuration, CCCH configuration and broadcast MRBs;
- 2> indicate to upper layers fallback of the RRC connection;
- 2> discard any application layer measurement reports which were not transmitted yet;
- 2> inform upper layers about the release of all application layer measurement configurations;
- 2> stop timer T380, if running;
- 1> perform the cell group configuration procedure in accordance with the received *masterCellGroup* and as specified in 5.3.5.5;
- 1> perform the radio bearer configuration procedure in accordance with the received *radioBearerConfig* and as specified in 5.3.5.6;
- 1> if stored, discard the cell reselection priority information provided by the *cellReselectionPriorities* or inherited from another RAT;
- 1> stop timer T300, T301, T319;
- 1> if T319a is running:
 - 2> stop T319a;
 - 2> consider SDT procedure is not ongoing;
- 1> if T390 is running:
 - 2> stop timer T390 for all access categories;
 - 2> perform the actions as specified in 5.3.14.4;
- 1> if T302 is running:
 - 2> stop timer T302;
 - 2> perform the actions as specified in 5.3.14.4;
- 1> stop timer T320, if running;
- 1> if the RRCSetup is received in response to an RRCResumeRequest, RRCResumeRequest1 or RRCSetupRequest:
 - 2> if T331 is running:
 - 3> stop timer T331;
 - 3> perform the actions as specified in 5.7.8.3;
 - 2> enter RRC CONNECTED;

- 2> stop the cell re-selection procedure;
- 2> stop relay (re)selection procedure if any for L2 U2N Remote UE;
- 1> consider the current cell to be the PCell;
- 1> perform the L2 U2N Remote UE configuration procedure in accordance with the received *sl-L2RemoteUE Config* as specified in 5.3.5.16;
- 1> perform the sidelink dedicated configuration procedure in accordance with the received *sl-ConfigDedicatedNR* as specified in 5.3.5.14;
- 1> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*:
 - 2> if reconnectCellId in VarRLF-Report is not set after failing to perform reestablishment:
 - 3> if the UE supports RLF-Report for conditional handover and if choCellId in VarRLF-Report is set:
 - 4> set *timeUntilReconnection* in *VarRLF-Report* to the time that elapsed since the radio link failure or handover failure experienced in the *failedPCellId* stored in *VarRLF-Report*;
 - 3> else:
 - 4> set *timeUntilReconnection* in *VarRLF-Report* to the time that elapsed since the last radio link failure or handover failure;
 - 3> set nrReconnectCellId in reconnectCellId in VarRLF-Report to the global cell identity and the tracking area code of the PCell;
- 1> if the UE supports RLF report for inter-RAT MRO NR as defined in TS 36.306 [62], and if the UE has radio link failure or handover failure information available in *VarRLF-Report* of TS 36.331 [10] and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report* of TS 36.331 [10]:
 - 2> if reconnectCellId in VarRLF-Report of TS 36.331[10] is not set after failing to perform reestablishment:
 - 3> set *timeUntilReconnection* in *VarRLF-Report* of TS 36.331[10] to the time that elapsed since the last radio link failure or handover failure in LTE;
 - 3> set *nrReconnectCellId* in *reconnectCellId* in *VarRLF-Report* of TS 36.331[10] to the global cell identity and the tracking area code of the PCell;
- 1> set the content of *RRCSetupComplete* message as follows:
 - 2> if upper layers provide a 5G-S-TMSI:
 - 3> if the RRCSetup is received in response to an RRCSetupRequest:
 - 4> set the *ng-5G-S-TMSI-Value* to *ng-5G-S-TMSI-Part2*;
 - 3> else:
 - 4> set the *ng-5G-S-TMSI-Value* to *ng-5G-S-TMSI*;
 - 2> if upper layers selected an SNPN or a PLMN and in case of PLMN UE is either allowed or instructed to access the PLMN via a cell for which at least one CAG ID is broadcast:
 - 3> set the *selectedPLMN-Identity* from the *npn-IdentityInfoList*;
 - 2> else:
 - 3> set the selectedPLMN-Identity to the PLMN selected by upper layers from the plmn-IdentityInfoList;
 - 2> if upper layers provide the 'Registered AMF':
 - 3> include and set the *registeredAMF* as follows:

- 4> if the PLMN identity of the 'Registered AMF' is different from the PLMN selected by the upper layers:
 - 5> include the *plmnIdentity* in the *registeredAMF* and set it to the value of the PLMN identity in the 'Registered AMF' received from upper layers;
- 4> set the *amf-Identifier* to the value received from upper layers;
- 3> include and set the *guami-Type* to the value provided by the upper layers;
- 2> if upper layers provide one or more S-NSSAI (see TS 23.003 [21]):
 - 3> include the s-NSSAI-List and set the content to the values provided by the upper layers;
- 2> if upper layers provide onboarding request indication:
 - 3> include the *onboardingRequest*;
- 2> set the dedicatedNAS-Message to include the information received from upper layers;
- 2> if connecting as an IAB-node:
 - 3> include the *iab-NodeIndication*;
- 2> if the SIB1 contains *idleModeMeasurementsNR* and the UE has NR idle/inactive measurement information concerning cells other than the PCell available in *VarMeasIdleReport*; or
- 2> if the SIB1 contains *idleModeMeasurementsEUTRA* and the UE has E-UTRA idle/inactive measurement information available in *VarMeasIdleReport*:
 - 3> include the *idleMeasAvailable*;
- 2> if the UE has logged measurements available for NR and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 3> include the *logMeasAvailable* in the *RRCSetupComplete* message;
 - 3> if Bluetooth measurement results are included in the logged measurements the UE has available for NR:
 - 4> include the *logMeasAvailableBT* in the *RRCSetupComplete* message;
 - 3> if WLAN measurement results are included in the logged measurements the UE has available for NR:
 - 4> include the *logMeasAvailableWLAN* in the *RRCSetupComplete* message;
- 2> if the *sigLoggedMeasType* in *VarLogMeasReport* is included:
 - 3> if T330 timer is running and the logged measurements configuration is for NR:
 - 4> set sigLogMeasConfigAvailable to true in the RRCSetupComplete message;
 - 3> else:
 - 4> if the UE has logged measurements available for NR:
 - 5> set sigLogMeasConfigAvailable to false in the RRCSetupComplete message;
- 2> if the UE has connection establishment failure or connection resume failure information available in VarConnEstFailReport or VarConnEstFailReportList and if the RPLMN is equal to plmn-Identity stored in VarConnEstFailReport or in at least one of the entries of VarConnEstFailReportList:
 - 3> include *connEstFailInfoAvailable* in the *RRCSetupComplete* message;
- 2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*, or

- 2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* of TS 36.331 [10], and if the UE is capable of cross-RAT RLF reporting and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report* of TS 36.331 [10]:
 - 3> include rlf-InfoAvailable in the RRCSetupComplete message;
- 2> if the UE has successful handover information available in *VarSuccessHO-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessHO-Report*:
 - 3> include successHO-InfoAvailable in the RRCSetupComplete message;
- 2> if the UE supports storage of mobility history information and the UE has mobility history information available in *VarMobilityHistoryReport*:
 - 3> include the *mobilityHistoryAvail* in the *RRCSetupComplete* message;
- 2> if the UE supports uplink RRC message segmentation of UECapabilityInformation:
 - 3> may include the *ul-RRC-Segmentation* in the *RRCSetupComplete* message;
- 2> if the RRCSetup is received in response to an RRCResumeRequest, RRCResumeRequest1 or RRCSetupRequest:
 - 3> if *speedStateReselectionPars* is configured in the *SIB2*:
 - 4> include the *mobilityState* in the *RRCSetupComplete* message and set it to the mobility state (as specified in TS 38.304 [20]) of the UE just prior to entering RRC_CONNECTED state;

1> submit the RRCSetupComplete message to lower layers for transmission, upon which the procedure ends.

5.3.3.5 Reception of the *RRCReject* by the UE

The UE shall:

1> perform the actions as specified in 5.3.15;

5.3.3.6 Cell re-selection or cell selection or relay (re)selection while T390, T300 or T302 is running (UE in RRC_IDLE)

The UE shall:

- 1> if cell reselection occurs while T300 or T302 is running; or
- 1> if relay reselection occurs while T300 is running; or
- 1> if cell changes due to relay reselection while T302 is running:
 - 2> perform the actions upon going to RRC_IDLE as specified in 5.3.11 with release cause 'RRC connection failure';

1> else:

- 2> if cell selection or reselection occurs while T390 is running; or
- 2> cell change due to relay selection or reselection occurs while T390 is running:
 - 3> stop T390 for all access categories;
 - 3> perform the actions as specified in 5.3.14.4.

5.3.3.7 T300 expiry

The UE shall:

1> if timer T300 expires:

- 2> reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established (except broadcast MRBs);
- 2> if the UE supports RRC Connection Establishment failure with temporary offset and the T300 has expired a consecutive *connEstFailCount* times on the same cell for which *connEstFailureControl* is included in *SIB1*:
 - 3> for a period as indicated by *connEstFailOffsetValidity*:
 - 4> use *connEstFailOffset* for the parameter *Qoffsettemp* for the concerned cell when performing cell selection and reselection according to TS 38.304 [20] and TS 36.304 [27];
- NOTE 1: When performing cell selection, if no suitable or acceptable cell can be found, it is up to UE implementation whether to stop using *connEstFailOffset* for the parameter *Qoffsettemp* during *connEstFailOffsetValidity* for the concerned cell.
 - 2> if the UE supports multiple CEF report:
 - 3> if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-identity* stored in *VarConnEstFailReport*; and
 - 3> if the cell identity of current cell is not equal to the cell identity stored in *measResultFailedCell* in *VarConnEstFailReport* and if the *maxCEFReport-r17* has not been reached:
 - 4> append the VarConnEstFailReport as a new entry in the VarConnEstFailReportList;
 - 2> if the UE has connection establishment failure information or connection resume failure information available in VarConnEstFailReport and if the RPLMN is not equal to plmn-identity stored in VarConnEstFailReport; or
 - 2> if the cell identity of current cell is not equal to the cell identity stored in *measResultFailedCell* in *VarConnEstFailReport*:
 - 3> reset the *numberOfConnFail* to 0;
 - 2> if the UE supports multiple CEF report and if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReportList* and if the RPLMN is not equal to *plmn-identity* stored in any entry of *VarConnEstFailReportList*:
 - 3> clear the content included in VarConnEstFailReportList;
 - 2> clear the content included in VarConnEstFailReport except for the numberOfConnFail, if any;
 - 2> store the following connection establishment failure information in the *VarConnEstFailReport* by setting its fields as follows:
 - 3> set the *plmn-Identity* to the PLMN selected by upper layers (see TS 24.501 [23]) from the PLMN(s) included in the *plmn-IdentityInfoList* in *SIB1*;
 - 3> set the measResultFailedCell to include the global cell identity, tracking area code, the cell level and SS/PBCH block level RSRP, and RSRQ, and SS/PBCH block indexes, of the failed cell based on the available SSB measurements collected up to the moment the UE detected connection establishment failure;
 - 3> if available, set the *measResultNeighCells*, in order of decreasing ranking-criterion as used for cell reselection, to include neighbouring cell measurements for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency as well as 3 inter-RAT neighbours, per frequency/set of frequencies per RAT and according to the following:
 - 4> for each neighbour cell included, include the optional fields that are available;
- NOTE 2: The UE includes the latest results of the available measurements as used for cell reselection evaluation, which are performed in accordance with the performance requirements as specified in TS 38.133 [14].
 - 3> if available, set the *locationInfo* as follows:

- 4> if available, set the *commonLocationInfo* to include the detailed location information;
- 4> if available, set the *bt-LocationInfo* to include the Bluetooth measurement results, in order of decreasing RSSI for Bluetooth beacons;
- 4> if available, set the *wlan-LocationInfo* to include the WLAN measurement results, in order of decreasing RSSI for WLAN APs;
- 4> if available, set the sensor-LocationInfo to include the sensor measurement results as follows;
 - 5> if available, include the *sensor-MeasurementInformation*;
 - 5> if available, include the *sensor-MotionInformation*;
- NOTE 3: Which location information related configuration is used by the UE to make the *locationInfo* available for inclusion in the *VarConnEstFailReport* is left to UE implementation.
 - 3> set *perRAInfoList* to indicate the performed random access procedure related information as specified in 5.7.10.5;
 - 3> if the *numberOfConnFail* is smaller than 8:
 - 4> increment the *numberOfConnFail* by 1;
 - 2> inform upper layers about the failure to establish the RRC connection, upon which the procedure ends;

The UE may discard the connection establishment failure or connection resume failure information, i.e. release the UE variable *VarConnEstFailReport* and the UE variable *VarConnEstFailReportList*, 48 hours after the last connection establishment failure is detected.

The L2 U2N Relay UE either indicates to upper layers (to trigger PC5 unicast link release) or sends Notification message to the connected L2 U2N Remote UE(s) in accordance with 5.8.9.10.

5.3.3.8 Abortion of RRC connection establishment

If upper layers abort the RRC connection establishment procedure, due to a NAS procedure being aborted as specified in TS 24.501 [23], while the UE has not yet entered RRC_CONNECTED, the UE shall:

- 1> stop timer T300, if running;
- 1> reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established (except broadcast MRBs).

The L2 U2N Relay UE either indicates to upper layers (to trigger PC5 unicast link release) or sends Notification message to the connected L2 U2N Remote UE(s) in accordance with 5.8.9.10.

The L2 U2N Remote UE indicates to upper layers to trigger PC5 unicast link release with its connected L2 U2N Relay UE.

5.3.4 Initial AS security activation

5.3.4.1 General

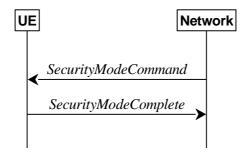


Figure 5.3.4.1-1: Security mode command, successful

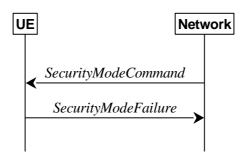


Figure 5.3.4.1-2: Security mode command, failure

The purpose of this procedure is to activate AS security upon RRC connection establishment.

5.3.4.2 Initiation

The network initiates the security mode command procedure to a UE in RRC_CONNECTED. Moreover, the network applies the procedure as follows:

- when only SRB1 is established, i.e. prior to establishment of SRB2, multicast MRBs and/ or DRBs.

5.3.4.3 Reception of the SecurityModeCommand by the UE

- 1> derive the K_{gNB} key, as specified in TS 33.501 [11];
- 1> derive the K_{RRCint} key associated with the *integrityProtAlgorithm* indicated in the *SecurityModeCommand* message, as specified in TS 33.501 [11];
- 1> request lower layers to verify the integrity protection of the SecurityModeCommand message, using the algorithm indicated by the integrityProtAlgorithm as included in the SecurityModeCommand message and the K_{RRCint} key;
- 1> if the SecurityModeCommand message passes the integrity protection check:
 - 2> derive the K_{RRCenc} key and the K_{UPenc} key associated with the *cipheringAlgorithm* indicated in the *SecurityModeCommand* message, as specified in TS 33.501 [11];
 - 2> derive the K_{UPint} key associated with the *integrityProtAlgorithm* indicated in the *SecurityModeCommand* message, as specified in TS 33.501 [11];
 - 2> configure lower layers to apply SRB integrity protection using the indicated algorithm and the K_{RRCint} key immediately, i.e. integrity protection shall be applied to all subsequent messages received and sent by the UE, including the SecurityModeComplete message;

- 2> configure lower layers to apply SRB ciphering using the indicated algorithm, the K_{RRCenc} keyafter completing the procedure, i.e. ciphering shall be applied to all subsequent messages received and sent by the UE, except for the *SecurityModeComplete* message which is sent unciphered;
- 2> consider AS security to be activated;
- 2> submit the SecurityModeComplete message to lower layers for transmission, upon which the procedure ends;

1> else:

- 2> continue using the configuration used prior to the reception of the *SecurityModeCommand* message, i.e. neither apply integrity protection nor ciphering.
- 2> submit the SecurityModeFailure message to lower layers for transmission, upon which the procedure ends.

5.3.5 RRC reconfiguration

5.3.5.1 General

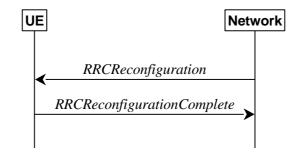


Figure 5.3.5.1-1: RRC reconfiguration, successful

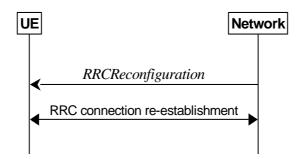


Figure 5.3.5.1-2: RRC reconfiguration, failure

The purpose of this procedure is to modify an RRC connection, e.g. to establish/modify/release RBs/BH RLC channels/Uu Relay RLC channels/PC5 Relay RLC channels, to perform reconfiguration with sync, to setup/modify/release measurements, to add/modify/release SCells and cell groups, to add/modify/release conditional handover configuration, to add/modify/release conditional PSCell change or conditional PSCell addition configuration. As part of the procedure, NAS dedicated information may be transferred from the Network to the UE.

RRC reconfiguration to perform reconfiguration with sync includes, but is not limited to, the following cases:

- reconfiguration with sync and security key refresh, involving RA to the PCell/PSCell, MAC reset, refresh of security and re-establishment of RLC and PDCP triggered by explicit L2 indicators;
- reconfiguration with sync but without security key refresh, involving RA to the PCell/PSCell, MAC reset and RLC re-establishment and PDCP data recovery (for AM DRB or AM MRB) triggered by explicit L2 indicators.
- reconfiguration with sync for DAPS and security key refresh, involving RA to the target PCell, establishment of target MAC, and
 - for non-DAPS bearer: refresh of security and re-establishment of RLC and PDCP triggered by explicit L2 indicators;

- for DAPS bearer: establishment of RLC for the target PCell, refresh of security and reconfiguration of PDCP to add the ciphering function, the integrity protection function and ROHC function of the target PCell;
- for SRB: refresh of security and establishment of RLC and PDCP for the target PCell;
- reconfiguration with sync for DAPS but without security key refresh, involving RA to the target PCell, establishment of target MAC, and
 - for non-DAPS bearer: RLC re-establishment and PDCP data recovery (for AM DRB or AM MRB) triggered by explicit L2 indicators.
 - for DAPS bearer: establishment of RLC for target PCell, reconfiguration of PDCP to add the ciphering function, the integrity protection function and ROHC function of the target PCell;
 - for SRB: establishment of RLC and PDCP for the target PCell.
- reconfiguration with sync for direct-to-indirect path switch, not involving RA at target side, involving reestablishment of PDCP /PDCP data recovery (for AM DRB) triggered by explicit L2 indicators.

In (NG)EN-DC and NR-DC, SRB3 can be used for measurement configuration and reporting, for UE assistance (re)configuration and reporting for power savings, for IP address (re-)configuration and reporting for IAB-nodes, to (re)configure MAC, RLC, BAP, physical layer and RLF timers and constants of the SCG configuration, and to reconfigure PDCP for DRBs associated with the S-K_{gNB} or SRB3, and to reconfigure SDAP for DRBs associated with S-K_{gNB} in NGEN-DC and NR-DC, and to add/modify/release conditional PSCell change configuration, provided that the (re)configuration does not require any MN involvement, and to transmit RRC messages between the MN and the UE during fast MCG link recovery. In (NG)EN-DC and NR-DC, only *measConfig, radioBearerConfig, conditionalReconfiguration, bap-Config, iab-IP-AddressConfigurationList, otherConfig* and/or *secondaryCellGroup* are included in *RRCReconfiguration* received via SRB3, except when *RRCReconfiguration* is received within *DLInformationTransferMRDC*.

5.3.5.2 Initiation

The Network may initiate the RRC reconfiguration procedure to a UE in RRC_CONNECTED. The Network applies the procedure as follows:

- the establishment of RBs (other than SRB1, that is established during RRC connection establishment) is performed only when AS security has been activated;
- the establishment of BH RLC Channels for IAB is performed only when AS security has been activated;
- the establishment of Uu Relay RLC channels and PC5 Relay RLC channels (other than SL-RLC0 and SL-RLC1) for L2 U2N Relay UE is performed only when AS security has been activated, and the establishment of PC5 Relay RLC channels for L2 U2N Remote UE (other than SL-RLC0 and SL-RLC1) is performed only when AS security has been activated;
- the addition of Secondary Cell Group and SCells is performed only when AS security has been activated;
- the *reconfigurationWithSync* is included in *secondaryCellGroup* only when at least one RLC bearer or BH RLC channel is setup in SCG;
- the *reconfigurationWithSync* is included in *masterCellGroup* only when AS security has been activated, and SRB2 with at least one DRB or multicast MRB or, for IAB, SRB2, are setup and not suspended;
- the *conditionalReconfiguration* for CPC is included only when at least one RLC bearer is setup in SCG;
- the *conditionalReconfiguration* for CHO or CPA is included only when AS security has been activated, and SRB2 with at least one DRB or multicast MRB or, for IAB, SRB2, are setup and not suspended.

5.3.5.3 Reception of an *RRCReconfiguration* by the UE

The UE shall perform the following actions upon reception of the *RRCReconfiguration*, or upon execution of the conditional reconfiguration (CHO, CPA or CPC):

1> if the *RRCReconfiguration* is applied due to a conditional reconfiguration execution upon cell selection performed while timer T311 was running, as defined in 5.3.7.3:

- 2> remove all the entries within the MCG and the SCG VarConditionalReconfig, if any;
- 1> if the *RRCReconfiguration* includes the *daps-SourceRelease*:
 - 2> reset the source MAC and release the source MAC configuration;
 - 2> for each DAPS bearer:
 - 3> release the RLC entity or entities as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the source SpCell;
 - 3> reconfigure the PDCP entity to release DAPS as specified in TS 38.323 [5];
 - 2> for each SRB:
 - 3> release the PDCP entity for the source SpCell;
 - 3> release the RLC entity as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the source SpCell;
 - 2> release the physical channel configuration for the source SpCell;
 - 2> discard the keys used in the source SpCell (the K_{gNB} key, the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key), if any;
- 1> if the RRCReconfiguration is received via other RAT (i.e., inter-RAT handover to NR):
 - 2> if the *RRCReconfiguration* does not include the *fullConfig* and the UE is connected to 5GC (i.e., delta signalling during intra 5GC handover):
 - 3> re-use the source RAT SDAP and PDCP configurations if available (i.e., current SDAP/PDCP configurations for all RBs from source E-UTRA RAT prior to the reception of the inter-RAT HO *RRCReconfiguration* message);

1> else:

- 2> if the RRCReconfiguration includes the fullConfig:
 - 3> perform the full configuration procedure as specified in 5.3.5.11;
- 1> if the *RRCReconfiguration* includes the *masterCellGroup*:
 - 2> perform the cell group configuration for the received *masterCellGroup* according to 5.3.5.5;
- 1> if the *RRCReconfiguration* includes the *masterKeyUpdate*:
 - 2> perform AS security key update procedure as specified in 5.3.5.7;
- 1> if the *RRCReconfiguration* includes the *sk-Counter*:
 - 2> perform security key update procedure as specified in 5.3.5.7;
- 1> if the RRCReconfiguration includes the secondaryCellGroup:
 - 2> perform the cell group configuration for the SCG according to 5.3.5.5;
- 1> if the RRCReconfiguration includes the mrdc-SecondaryCellGroupConfig:
 - 2> if the *mrdc-SecondaryCellGroupConfig* is set to *setup*:
 - 3> if the *mrdc-SecondaryCellGroupConfig* includes *mrdc-ReleaseAndAdd*:
 - 4> perform MR-DC release as specified in clause 5.3.5.10;
 - 3> if the received *mrdc-SecondaryCellGroup* is set to *nr-SCG*:
 - 4> perform the RRC reconfiguration according to 5.3.5.3 for the *RRCReconfiguration* message included in *nr-SCG*;

- 3> if the received *mrdc-SecondaryCellGroup* is set to *eutra-SCG*:
 - 4> perform the RRC connection reconfiguration as specified in TS 36.331 [10], clause 5.3.5.3 for the *RRCConnectionReconfiguration* message included in *eutra-SCG*;
- 2> else (*mrdc-SecondaryCellGroupConfig* is set to *release*):
 - 3> perform MR-DC release as specified in clause 5.3.5.10;
- 1> if the RRCReconfiguration message includes the radioBearerConfig:
 - 2> perform the radio bearer configuration according to 5.3.5.6;
- 1> if the RRCReconfiguration message includes the radioBearerConfig2:
 - 2> perform the radio bearer configuration according to 5.3.5.6;
- 1> if the *RRCReconfiguration* message includes the *measConfig*:
 - 2> perform the measurement configuration procedure as specified in 5.5.2;
- 1> if the RRCReconfiguration message includes the dedicatedNAS-MessageList:
 - 2> forward each element of the dedicatedNAS-MessageList to upper layers in the same order as listed;
- 1> if the RRCReconfiguration message includes the dedicatedSIB1-Delivery:
 - 2> perform the action upon reception of SIB1 as specified in 5.2.2.4.2;
- NOTE 0: If this *RRCReconfiguration* is associated to the MCG and includes *reconfigurationWithSync* in *spCellConfig* and *dedicatedSIB1-Delivery*, the UE initiates (if needed) the request to acquire required SIBs, according to clause 5.2.2.3.5, only after the random access procedure towards the target SpCell is completed.
- 1> if the RRCReconfiguration message includes the dedicatedSystemInformationDelivery:
 - 2> perform the action upon reception of System Information as specified in 5.2.2.4;
- 1> if the RRCReconfiguration message includes the dedicatedPosSysInfoDelivery:
 - 2> perform the action upon reception of the contained posSIB(s), as specified in clause 5.2.2.4.16;
- 1> if the RRCReconfiguration message includes the otherConfig:
 - 2> perform the other configuration procedure as specified in 5.3.5.9;
- 1> if the RRCReconfiguration message includes the bap-Config:
 - 2> perform the BAP configuration procedure as specified in 5.3.5.12;
- 1> if the RRCReconfiguration message includes the iab-IP-AddressConfigurationList:
 - 2> if *iab-IP-AddressToReleaseList* is included:
 - 3> perform release of IP address as specified in 5.3.5.12a.1.1;
 - 2> if iab-IP-AddressToAddModList is included:
 - 3> perform IAB IP address addition/update as specified in 5.3.5.12a.1.2;
- 1> if the RRCReconfiguration message includes the conditionalReconfiguration:
 - 2> perform conditional reconfiguration as specified in 5.3.5.13;
- 1> if the RRCReconfiguration message includes the needForGapsConfigNR:
 - 2> if *needForGapsConfigNR* is set to *setup*:

- 3> consider itself to be configured to provide the measurement gap requirement information of NR target bands;
- 2> else:
 - 3> consider itself not to be configured to provide the measurement gap requirement information of NR target bands:
- 1> if the RRCReconfiguration message includes the needForGapNCSG-ConfigNR:
 - 2> if *needForGapNCSG-ConfigNR* is set to *setup*:
 - 3> consider itself to be configured to provide the measurement gap and NCSG requirement information of NR target bands;
 - 2> else:
 - 3> consider itself not to be configured to provide the measurement gap and NCSG requirement information of NR target bands;
- 1> if the RRCReconfiguration message includes the needForGapNCSG-ConfigEUTRA:
 - 2> if needForGapNCSG-ConfigEUTRA is set to setup:
 - 3> consider itself to be configured to provide the measurement gap and NCSG requirement information of E-UTRA target bands;
 - 2> else:
 - 3> consider itself not to be configured to provide the measurement gap and NCSG requirement information of E-UTRA target bands;
- 1> if the RRCReconfiguration message includes the sl-ConfigDedicatedNR:
 - 2> perform the sidelink dedicated configuration procedure as specified in 5.3.5.14;
- NOTE 0a: If the *sl-ConfigDedicatedNR* was received embedded within an E-UTRA *RRCConnectionReconfiguration* message, the UE does not build an NR *RRCReconfigurationComplete* message for the received *sl-ConfigDedicatedNR*.
- 1> if the RRCReconfiguration message includes the sl-L2RelayUE-Config:
 - 2> perform the L2 U2N Relay UE configuration procedure as specified in 5.3.5.15;
- 1> if the RRCReconfiguration message includes the sl-L2RemoteUE-Config:
 - 2> perform the L2 U2N Remote UE configuration procedure as specified in 5.3.5.16;
- 1> if the RRCReconfiguration message includes the dedicatedPagingDelivery:
 - 2> perform the *Paging* message reception procedure as specified in 5.3.2.3;
- 1> if the RRCReconfiguration message includes the sl-ConfigDedicatedEUTRA-Info:
 - 2> perform related procedures for V2X sidelink communication in accordance with TS 36.331 [10], clause 5.3.10 and clause 5.5.2;
- 1> if the RRCReconfiguration message includes the ul-GapFR2-Config:
 - 2> perform the FR2 UL gap configuration procedure as specified in 5.3.5.13c;
- 1> if the RRCReconfiguration message includes the musim-GapConfig:
 - 2> perform the MUSIM gap configuration procedure as specified in 5.3.5.9a;
- 1> if the RRCReconfiguration message includes the appLayerMeasConfig:
 - 2> perform the application layer measurement configuration procedure as specified in 5.3.5.13d;

- 1> if the RRCReconfiguration message includes the ue-TxTEG-RequestUL-TDOA-Config:
 - 2> if *ue-TxTEG-RequestUL-TDOA-Config* is set to *setup*:
 - 3> perform the UE positioning assistance information procedure as specified in 5.7.14;
 - 2> else:
 - 3> release the configuration of UE positioning assistance information;
- 1> set the content of the RRCReconfigurationComplete message as follows:
 - 2> if the RRCReconfiguration includes the masterCellGroup containing the reportUplinkTxDirectCurrent:
 - 3> include the *uplinkTxDirectCurrentList* for each MCG serving cell with UL;
 - 3> include *uplinkDirectCurrentBWP-SUL* for each MCG serving cell configured with SUL carrier, if any, within the *uplinkTxDirectCurrentList*;
 - 2> if the *RRCReconfiguration* includes the *masterCellGroup* containing the *reportUplinkTxDirectCurrentTwoCarrier*:
 - 3> include in the *uplinkTxDirectCurrentTwoCarrierList* the list of uplink Tx DC locations for the configured intra-band uplink carrier aggregation in the MCG;
 - 2> if the *RRCReconfiguration* includes the *masterCellGroup* containing the *reportUplinkTxDirectCurrentMoreCarrier*:
 - 3> include in the *uplinkTxDirectCurrentMoreCarrierList* the list of uplink Tx DC locations for the configured intra-band uplink carrier aggregation in the MCG;
 - 2> if the RRCReconfiguration includes the secondaryCellGroup containing the reportUplinkTxDirectCurrent:
 - 3> include the *uplinkTxDirectCurrentList* for each SCG serving cell with UL;
 - 3> include *uplinkDirectCurrentBWP-SUL* for each SCG serving cell configured with SUL carrier, if any, within the *uplinkTxDirectCurrentList*;
 - 2> if the *RRCReconfiguration* includes the *secondaryCellGroup* containing the *reportUplinkTxDirectCurrentTwoCarrier*:
 - 3> include in the *uplinkTxDirectCurrentTwoCarrierList* the list of uplink Tx DC locations for the configured intra-band uplink carrier aggregation in the SCG;
 - 2> if the *RRCReconfiguration* includes the *secondaryCellGroup* containing the *reportUplinkTxDirectCurrentMoreCarrier*:
 - 3> include in the *uplinkTxDirectCurrentMoreCarrierList* the list of uplink Tx DC locations for the configured intra-band uplink carrier aggregation in the SCG;
- NOTE 0b: The UE does not expect that the *reportUplinkTxDirectCurrentTwoCarrier* or *reportUplinkTxDirectCurrentMoreCarrier* is received in both *masterCellGroup* and in *secondaryCellGroup*. Network only configures at most one of *reportUplinkTxDirectCurrent*, *reportUplinkTxDirectCurrentTwoCarrier* or *reportUplinkTxDirectCurrentMoreCarrier* in one RRC message.
 - 2> if the RRCReconfiguration message includes the mrdc-SecondaryCellGroupConfig with mrdc-SecondaryCellGroup set to eutra-SCG:
 - 3> include in the *eutra-SCG-Response* the E-UTRA *RRCConnectionReconfigurationComplete* message in accordance with TS 36.331 [10] clause 5.3.5.3;
 - 2> if the *RRCReconfiguration* message includes the *mrdc-SecondaryCellGroupConfig* with *mrdc-SecondaryCellGroup* set to *nr-SCG*:
 - 3> include in the *nr-SCG-Response* the SCG *RRCReconfigurationComplete* message;

- 3> if the *RRCReconfiguration* message is applied due to conditional reconfiguration execution and the *RRCReconfiguration* message does not include the *reconfigurationWithSync* in the *masterCellGroup*:
 - 4> include in the *selectedCondRRCReconfig* the *condReconfigId* for the selected cell of conditional reconfiguration execution;
- 2> if the RRCReconfiguration includes the reconfigurationWithSync in spCellConfig of an MCG:
 - 3> if the UE has logged measurements available for NR and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 4> include the *logMeasAvailable* in the *RRCReconfigurationComplete* message;
 - 4> if Bluetooth measurement results are included in the logged measurements the UE has available for NR:
 - 5> include the *logMeasAvailableBT* in the *RRCReconfigurationComplete* message;
 - 4> if WLAN measurement results are included in the logged measurements the UE has available for NR:
 - 5> include the *logMeasAvailableWLAN* in the *RRCReconfigurationComplete* message;
 - 3> if the *sigLoggedMeasType* in *VarLogMeasReport* is included:
 - 4> if T330 timer is running and the logged measurements configuration is for NR:
 - 5> set sigLogMeasConfigAvailable to true in the RRCReconfigurationComplete message;
 - 4> else:
 - 5> if the UE has logged measurements available for NR:
 - 6> set sigLogMeasConfigAvailable to false in the RRCReconfigurationComplete message;
 - 3> if the UE has connection establishment failure or connection resume failure information available in VarConnEstFailReport or VarConnEstFailReportList and if the RPLMN is equal to plmn-Identity stored in VarConnEstFailReport or in at least one of the entries of VarConnEstFailReportList:
 - 4> include connEstFailInfoAvailable in the RRCReconfigurationComplete message;
 - 3> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*; or
 - 3> if the UE has radio link failure or handover failure information available in *VarRLF-Report* of TS 36.331 [10] and if the UE is capable of cross-RAT RLF reporting and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report* of TS 36.331 [10]:
 - 4> include rlf-InfoAvailable in the RRCReconfigurationComplete message;
 - 3> if the UE was configured with successHO-Config when connected to the source PCell; and
 - 3> if the applied *RRCReconfiguration* is not due to a conditional reconfiguration execution upon cell selection performed while timer T311 was running, as defined in 5.3.7.3:
 - 4> perform the actions for the successful handover report determination as specified in clause 5.7.10.6, upon successfully completing the Random Access procedure triggered for the *reconfigurationWithSync* in *spCellConfig* of the MCG;
 - 3> if the UE has successful handover information available in *VarSuccessHO-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessHO-Report*:
 - 4> include successHO-InfoAvailable in the RRCReconfigurationComplete message;
- 2> if the *RRCReconfiguration* message was received via SRB1, but not within *mrdc-SecondaryCellGroup* or E-UTRA *RRCConnectionResume*:
 - 3> if the UE is configured to provide the measurement gap requirement information of NR target bands:

- 4> if the RRCReconfiguration message includes the needForGapsConfigNR; or
- 4> if the *NeedForGapsInfoNR* information is changed compared to last time the UE reported this information:
 - 5> include the *NeedForGapsInfoNR* and set the contents as follows:
 - 6> include *intraFreq-needForGap* and set the gap requirement information of intra-frequency measurement for each NR serving cell;
 - 6> if requestedTargetBandFilterNR is configured:
 - 7> for each supported NR band that is also included in *requestedTargetBandFilterNR*, include an entry in *interFreq-needForGap* and set the gap requirement information for that band;
 - 6> else:
 - 7> include an entry in *interFreq-needForGap* and set the corresponding gap requirement information for each supported NR band;
- 3> if the UE is configured to provide the measurement gap and NCSG requirement information of NR target bands:
 - 4> if the RRCReconfiguration message includes the needForGapNCSG-ConfigNR; or
 - 4> if the *needForGapNCSG-InfoNR* information is changed compared to last time the UE reported this information:
 - 5> include the *NeedForGapNCSG-InfoNR* and set the contents as follows:
 - 6> include *intraFreq-needForNCSG* and set the gap and NCSG requirement information of intrafrequency measurement for each NR serving cell;
 - 6> if requestedTargetBandFilterNCSG-NR is configured:
 - 7> for each supported NR band included in *requestedTargetBandFilterNCSG-NR*, include an entry in *interFreq-needForNCSG* and set the NCSG requirement information for that band;
 - 6> else:
 - 7> include an entry for each supported NR band in *interFreq-needForNCSG* and set the corresponding NCSG requirement information;
- 3> if the UE is configured to provide the measurement gap and NCSG requirement information of E-UTRA target bands:
 - 4> if the RRCReconfiguration message includes the needForGapNCSG-ConfigEUTRA; or
 - 4> if the *needForGapNCSG-InfoEUTRA* information is changed compared to last time the UE reported this information:
 - 5> include the *NeedForGapNCSG-InfoEUTRA* and set the contents as follows:
 - 6> if requestedTargetBandFilterNCSG-EUTRA is configured, for each supported E-UTRA band included in requestedTargetBandFilterNCSG-EUTRA, include an entry in needForNCSG-EUTRA and set the NCSG requirement information for that band; otherwise, include an entry for each supported E-UTRA band in needForNCSG-EUTRA and set the corresponding NCSG requirement information;
- 1> if the UE is configured with E-UTRA nr-SecondaryCellGroupConfig (UE in (NG)EN-DC):
 - 2> if the RRCReconfiguration message was received via E-UTRA SRB1 as specified in TS 36.331 [10]; or
 - 2> if the *RRCReconfiguration* message was received via E-UTRA RRC message *RRCConnectionReconfiguration* within *MobilityFromNRCommand* (handover from NR standalone to (NG)EN-DC);

- 3> if the *RRCReconfiguration* is applied due to a conditional reconfiguration execution for CPC which is configured via *conditionalReconfiguration* contained in *nr-SecondaryCellGroupConfig* specified in TS 36.331 [10]:
 - 4> submit the *RRCReconfigurationComplete* message via the E-UTRA MCG embedded in E-UTRA RRC message *ULInformationTransferMRDC* as specified in TS 36.331 [10], clause 5.6.2a.
- 3> else if the RRCReconfiguration message was included in E-UTRA RRCConnectionResume message:
 - 4> submit the *RRCReconfigurationComplete* message via E-UTRA embedded in E-UTRA RRC message *RRCConnectionResumeComplete* as specified in TS 36.331 [10], clause 5.3.3.4a;
- 3> else:
 - 4> submit the *RRCReconfigurationComplete* via E-UTRA embedded in E-UTRA RRC message *RRCConnectionReconfigurationComplete* as specified in TS 36.331 [10], clause 5.3.5.3/5.3.5.4/5.4.2.3;
- 3> if the *scg-State* is not included in the E-UTRA message (*RRCConnectionReconfiguration* or *RRCConnectionResume*) containing the *RRCReconfiguration* message:
 - 4> perform SCG activation as specified in 5.3.5.13a;
 - 4> if reconfigurationWithSync was included in spCellConfig of an SCG:
 - 5> initiate the Random Access procedure on the PSCell, as specified in TS 38.321 [3];
 - 4> else if the SCG was deactivated before the reception of the E-UTRA RRC message containing the *RRCReconfiguration* message:
 - 5> if bfd-and-RLM was not configured to true before the reception of the E-UTRA RRCConnectionReconfiguration or RRCConnectionResume message containing the RRCReconfiguration message or if lower layers indicate that a Random Access procedure is needed for SCG activation:
 - 6> initiate the Random Access procedure on the SpCell, as specified in TS 38.321 [3];
 - 5> else the procedure ends;
 - 4> else the procedure ends;
- 3> else:
 - 4> perform SCG deactivation as specified in 5.3.5.13b;
 - 4> the procedure ends;
- 2> if the RRCReconfiguration message was received within nr-SecondaryCellGroupConfig in RRCConnectionReconfiguration message received via SRB3 within DLInformationTransferMRDC:
 - 3> submit the *RRCReconfigurationComplete* via E-UTRA embedded in E-UTRA RRC message *RRCConnectionReconfigurationComplete* as specified in TS 36.331 [10], clause 5.3.5.3/5.3.5.4;
 - 3> if the *scg-State* is not included in the *RRCConnectionReconfiguration*:
 - 4> if reconfigurationWithSync was included in spCellConfig of an SCG:
 - 5> initiate the Random Access procedure on the SpCell, as specified in TS 38.321 [3];
 - 4> else the procedure ends;
 - 3> else:
 - 4> perform SCG deactivation as specified in 5.3.5.13b;
 - 4> the procedure ends;

- NOTE 1: The order the UE sends the *RRCConnectionReconfigurationComplete* message and performs the Random Access procedure towards the SCG is left to UE implementation.
 - 2> else (RRCReconfiguration was received via SRB3) but not within DLInformationTransferMRDC:
 - 3> submit the *RRCReconfigurationComplete* message via SRB3 to lower layers for transmission using the new configuration;
- NOTE 2: In (NG)EN-DC and NR-DC, in the case *RRCReconfiguration* is received via SRB1 or within *DLInformationTransferMRDC* via SRB3, the random access is triggered by RRC layer itself as there is not necessarily other UL transmission. In the case *RRCReconfiguration* is received via SRB3 but not within *DLInformationTransferMRDC*, the random access is triggered by the MAC layer due to arrival of *RRCReconfigurationComplete*.
- 1> else if the *RRCReconfiguration* message was received via SRB1 within the *nr-SCG* within *mrdc-SecondaryCellGroup* (UE in NR-DC, *mrdc-SecondaryCellGroup* was received in *RRCReconfiguration* or *RRCResume* via SRB1):
 - 2> if the *RRCReconfiguration* is applied due to a conditional reconfiguration execution for CPC which is configured via *conditionalReconfiguration* contained in *nr-SCG* within *mrdc-SecondaryCellGroup*:
 - 3> submit the *RRCReconfigurationComplete* message via the NR MCG embedded in NR RRC message *ULInformationTransferMRDC* as specified in clause 5.7.2a.3.
 - 2> if the *scg-State* is not included in the *RRCReconfiguration* or *RRCResume* message containing the *RRCReconfiguration* message:
 - 3> perform SCG activation as specified in 5.3.5.13a;
 - 3> if reconfigurationWithSync was included in spCellConfig in nr-SCG:
 - 4> initiate the Random Access procedure on the PSCell, as specified in TS 38.321 [3];
 - 3> else if the SCG was deactivated before the reception of the NR RRC message containing the *RRCReconfiguration* message:
 - 4> if *bfd-and-RLM* was not configured to *true* before the reception of the *RRCReconfiguration* or *RRCResume* message containing the *RRCReconfiguration* message; or
 - 4> if lower layers indicate that a Random Access procedure is needed for SCG activation:
 - 5> initiate the Random Access procedure on the PSCell, as specified in TS 38.321 [3];
 - 4> else the procedure ends;
 - 3> else the procedure ends;
 - 2> else
 - 3> perform SCG deactivation as specified in 5.3.5.13b;
 - 3> the procedure ends;
- NOTE 2a: The order in which the UE sends the *RRCReconfigurationComplete* message and performs the Random Access procedure towards the SCG is left to UE implementation.
- 1> else if the RRCReconfiguration message was received via SRB3 (UE in NR-DC):
 - 2> if the RRCReconfiguration message was received within DLInformationTransferMRDC:
 - 3> if the *RRCReconfiguration* message was received within the *nr-SCG* within *mrdc-SecondaryCellGroup* (NR SCG RRC Reconfiguration):
 - 4> if the *scg-State* is not included in the *RRCReconfiguration* message containing the *RRCReconfiguration* message:
 - 5> if reconfigurationWithSync was included in spCellConfig in nr-SCG:

- 6> initiate the Random Access procedure on the PSCell, as specified in TS 38.321 [3];
- 5> else:
 - 6> the procedure ends;
- 4> else:
 - 5> perform SCG deactivation as specified in 5.3.5.13b;
 - 5> the procedure ends;
- 3> else:
 - 4> if the RRCReconfiguration does not include the mrdc-SecondaryCellGroupConfig:
 - 5> if the *RRCReconfiguration* includes the *scg-State*:
 - 6> perform SCG deactivation as specified in 5.3.5.13b;
 - 4> submit the *RRCReconfigurationComplete* message via SRB1 to lower layers for transmission using the new configuration;
- 2> else:
 - 3> submit the *RRCReconfigurationComplete* message via SRB3 to lower layers for transmission using the new configuration;
- 1> else (*RRCReconfiguration* was received via SRB1):
 - 2> if the UE is in NR-DC and;
 - 2> if the RRCReconfiguration does not include the mrdc-SecondaryCellGroupConfig:
 - 3> if the RRCReconfiguration includes the scg-State:
 - 4> perform SCG deactivation as specified in 5.3.5.13b;
 - 3> else:
 - 4> perform SCG activation without SN message as specified in 5.3.5.13b1;
 - 2> if the *reconfigurationWithSync* was included in *spCellConfig* of an MCG:
 - 3> if ta-Report is configured with value enabled and the UE supports TA reporting:
 - 4> indicate TA report initiation to lower layers;
 - 2> submit the *RRCReconfigurationComplete* message via SRB1 to lower layers for transmission using the new configuration;
 - 2> if this is the first *RRCReconfiguration* message after successful completion of the RRC re-establishment procedure:
 - 3> resume SRB2, SRB4, DRBs, multicast MRB, and BH RLC channels for IAB-MT, and Uu Relay RLC channels for L2 U2N Relay UE, that are suspended;
- 1> if *reconfigurationWithSync* was included in *spCellConfig* of an MCG or SCG and when MAC of an NR cell group successfully completes a Random Access procedure triggered above; or,
- 1> if *sl-PathSwitchConfig* was included in *reconfigurationWithSync* included in *spCellConfig* of an MCG, and when successfully sending *RRCReconfigurationComplete* message (i.e., PC5 RLC acknowledgement is received from target L2 U2N Relay UE):
 - 2> stop timer T304 for that cell group if running;
 - 2> if sl-PathSwitchConfig was included in reconfigurationWithSync:

- 3> stop timer T420;
- 3> release all radio resources, including release of the RLC entities and the MAC configuration at the source side:
- 3> reset MAC used in the source cell;
- NOTE 2b:PDCP and SDAP configured by the source prior to the path switch that are reconfigured and re-used by target when delta signalling is used, are not released as part of this procedure.
 - 2> stop timer T310 for source SpCell if running;
 - 2> apply the parts of the CSI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the respective target SpCell, if any;
 - 2> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the respective target SpCell (e.g. measurement gaps, periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of that target SpCell;
 - 2> for each DRB configured as DAPS bearer, request uplink data switching to the PDCP entity, as specified in TS 38.323 [5];
 - 2> if the reconfigurationWithSync was included in spCellConfig of an MCG:
 - 3> if T390 is running:
 - 4> stop timer T390 for all access categories;
 - 4> perform the actions as specified in 5.3.14.4.
 - 3> if T350 is running:
 - 4> stop timer T350;
 - 3> if RRCReconfiguration does not include dedicatedSIB1-Delivery and
 - 3> if the active downlink BWP, which is indicated by the *firstActiveDownlinkBWP-Id* for the target SpCell of the MCG, has a common search space configured by *searchSpaceSIB1*:
 - 4> acquire the SIB1, which is scheduled as specified in TS 38.213 [13], of the target SpCell of the MCG;
 - 4> upon acquiring SIB1, perform the actions specified in clause 5.2.2.4.2;
 - 2> if the reconfigurationWithSync was included in spCellConfig of an MCG; or
 - 2> if the *reconfigurationWithSync* was included in *spCellConfig* of an SCG and the CPA or CPC was configured:
 - 3> remove all the entries within the MCG and the SCG VarConditionalReconfig, if any;
 - 3> remove all the entries within *VarConditionalReconfiguration* as specified in TS 36.331 [10], clause 5.3.5.9.6, if any;
 - 3> for each *measId* of the MCG *measConfig*, if configured, and for each *measId* of the SCG *measConfig*, if configured, if the associated *reportConfig* has a *reportType* set to *condTriggerConfig*:
 - 4> for the associated *reportConfigId*:
 - 5> remove the entry with the matching *reportConfigId* from the *reportConfigList* within the *VarMeasConfig*;
 - 4> if the associated *measObjectId* is only associated to a *reportConfig* with *reportType* set to *condTriggerConfig*:
 - 5> remove the entry with the matching *measObjectId* from the *measObjectList* within the *VarMeasConfig*;

- 4> remove the entry with the matching measId from the measIdList within the VarMeasConfig;
- 2> if reconfigurationWithSync was included in masterCellGroup or secondaryCellGroup:
 - 3> if the UE initiated transmission of a *UEAssistanceInformation* message for the corresponding cell group during the last 1 second, and the UE is still configured to provide the concerned UE assistance information for the corresponding cell group; or
 - 3> if the *RRCReconfiguration* message is applied due to a conditional reconfiguration execution, and the UE is configured to provide UE assistance information for the corresponding cell group, and the UE has initiated transmission of a *UEAssistanceInformation* message for the corresponding cell group since it was configured to do so in accordance with 5.7.4.2:
 - 4> initiate transmission of a *UEAssistanceInformation* message for the corresponding cell group in accordance with clause 5.7.4.3 to provide the concerned UE assistance information;
 - 4> start or restart the prohibit timer (if exists) or the leave without response timer for the MUSIM associated with the concerned UE assistance information with the timer value set to the value in corresponding configuration;
 - 3> if SIB12 is provided by the target PCell, and the UE initiated transmission of a SidelinkUEInformationNR message indicating a change of NR sidelink communication/discovery related parameters relevant in target PCell (i.e. change of sl-RxInterestedFreqList or sl-TxResourceReqList) during the last 1 second preceding reception of the RRCReconfiguration message including reconfigurationWithSync in spCellConfig of an MCG; or
 - 3> if the *RRCReconfiguration* message is applied due to a conditional reconfiguration execution and the UE is capable of NR sidelink communication/discovery and *SIB12* is provided by the target PCell, and the UE has initiated transmission of a *SidelinkUEInformationNR* message since it was configured to do so in accordance with 5.8.3.2:
 - 4> initiate transmission of the SidelinkUEInformationNR message in accordance with 5.8.3.3;
- 2> if reconfigurationWithSync was included in masterCellGroup:
 - 3> if configured with application layer measurements and if application layer measurement report container has been received from upper layers for which the successful transmission of the message or at least one segment of the message has not been confirmed by lower layers:
 - 4> re-submit the *MeasurementReportAppLayer* message or all segments of the *MeasurementReportAppLayer* message to lower layers for transmission via SRB4;
- 2> if reconfigurationWithSync was included in masterCellGroup and the target cell provides SIB21:
 - 3> if the UE initiated transmission of an *MBSInterestIndication* message during the last 1 second preceding reception of this *RRCReconfiguration* message; or
 - 3> if the *RRCReconfiguration* message is applied due to a conditional reconfiguration execution, and the UE has initiated transmission of an *MBSInterestIndication* message after having received this *RRCReconfiguration* message:
 - 4> initiate transmission of an MBSInterestIndication message in accordance with clause 5.9.4;
- 2> the procedure ends.
- NOTE 3: The UE is only required to acquire broadcasted *SIB1* if the UE can acquire it without disrupting unicast or MBS multicast data reception, i.e. the broadcast and unicast/MBS multicast beams are quasi co-located.
- NOTE 4: The UE sets the content of *UEAssistanceInformation* according to latest configuration (i.e. the configuration after applying the *RRCReconfiguration* message) and latest UE preference. The UE may include more than the concerned UE assistance information within the *UEAssistanceInformation* according to 5.7.4.2. Therefore, the content of *UEAssistanceInformation* message might not be the same as the content of the previous *UEAssistanceInformation* message.

5.3.5.4 Secondary cell group release

The UE shall:

- 1> as a result of SCG release triggered by E-UTRA (i.e. (NG)EN-DC case) or NR (i.e. NR-DC case):
 - 2> reset SCG MAC, if configured;
 - 2> for each RLC bearer that is part of the SCG configuration:
 - 3> perform RLC bearer release procedure as specified in 5.3.5.5.3;
 - 2> for each BH RLC channel that is part of the SCG configuration:
 - 3> perform BH RLC channel release procedure as specified in 5.3.5.5.10;
 - 2> release the SCG configuration;
 - 2> remove all the entries within the SCG VarConditionalReconfig, if any;
 - 2> if SCG release was triggered by NR (i.e. NR-DC case):
 - 3> remove all the entries within the MCG *VarConditionalReconfig* for which the *RRCReconfiguration* within *condRRCReconfig* does not include the *masterCellGroup* with *reconfigurationWithSync*, if any;
 - 2> else (i.e. EN-DC case):
 - 3> perform VarConditionalReconfiguration CPC removal as specified in TS 36.331 [10] clause 5.3.5.9.7;
 - 2> stop timer T310 for the corresponding SpCell, if running;
 - 2> stop timer T312 for the corresponding SpCell, if running;
 - 2> stop timer T304 for the corresponding SpCell, if running.

NOTE: Release of cell group means only release of the lower layer configuration of the cell group but the *RadioBearerConfig* may not be released.

5.3.5.5 Cell Group configuration

5.3.5.5.1 General

The network configures the UE with Master Cell Group (MCG), and zero or one Secondary Cell Group (SCG). In (NG)EN-DC, the MCG is configured as specified in TS 36.331 [10], and for NE-DC, the SCG is configured as specified in TS 36.331 [10]. The network provides the configuration parameters for a cell group in the *CellGroupConfig* IE.

The UE performs the following actions based on a received CellGroupConfig IE:

- 1> if the CellGroupConfig contains the spCellConfig with reconfigurationWithSync:
 - 2> perform Reconfiguration with sync according to 5.3.5.5.2;
 - 2> resume all suspended radio bearers except the SRBs for the source cell group, and resume SCG transmission for all radio bearers, and resume BH RLC channels and resume SCG transmission for BH RLC channels for IAB-MT, if suspended;
- NOTE: If the SCG is deactivated, resuming SCG transmission for all radio bearers does not imply that PDCP PDUs can be transmitted or received on SCG RLC bearers.
- 1> if the *CellGroupConfig* contains the *rlc-BearerToReleaseList or rlc-BearerToReleaseListExt*:
 - 2> perform RLC bearer release as specified in 5.3.5.5.3;
- 1> if the CellGroupConfig contains the rlc-BearerToAddModList:

- 2> perform the RLC bearer addition/modification as specified in 5.3.5.5.4;
- 1> if the *CellGroupConfig* contains the *mac-CellGroupConfig*:
 - 2> configure the MAC entity of this cell group as specified in 5.3.5.5.5;
- 1> if the CellGroupConfig contains the sCellToReleaseList:
 - 2> perform SCell release as specified in 5.3.5.5.8;
- 1> if the CellGroupConfig contains the spCellConfig:
 - 2> configure the SpCell as specified in 5.3.5.5.7;
- 1> if the *CellGroupConfig* contains the *sCellToAddModList*:
 - 2> perform SCell addition/modification as specified in 5.3.5.5.9;
- 1> if the CellGroupConfig contains the bh-RLC-ChannelToReleaseList:
 - 2> perform BH RLC channel release as specified in 5.3.5.5.10;
- 1> if the CellGroupConfig contains the bh-RLC-ChannelToAddModList:
 - 2> perform the BH RLC channel addition/modification as specified in 5.3.5.5.11;
- 1> if the CellGroupConfig contains the uu-RelayRLC-ChannelToReleaseList:
 - 2> perform Uu Relay RLC channel release as specified in 5.3.5.5.12;
- 1> if the CellGroupConfig contains the uu-RelayRLC-ChannelToAddModList:
 - 2> perform the Uu Relay RLC channel addition/modification as specified in 5.3.5.5.13;

5.3.5.5.2 Reconfiguration with sync

The UE shall perform the following actions to execute a reconfiguration with sync.

- 1> if the AS security is not activated, perform the actions upon going to RRC_IDLE as specified in 5.3.11 with the release cause 'other' upon which the procedure ends;
- 1> stop timer T430 if running;
- 1> start timer T430 with the timer value set to *ntn-UlSyncValidityDuration* from the subframe indicated by *epochTime*, according to the target cell *NTN-config*;
- 1> if no DAPS bearer is configured:
 - 2> stop timer T310 for the corresponding SpCell, if running;
- 1> if this procedure is executed for the MCG:
 - 2> if timer T316 is running;
 - 3> stop timer T316;
 - 3> clear the information included in *VarRLF-Report*, if any;
 - 2> resume MCG transmission, if suspended.
- 1> stop timer T312 for the corresponding SpCell, if running;
- 1> if sl-PathSwitchConfig is included:
 - 2> consider the target L2 U2N Relay UE to be the one indicated by the *targetRelayUE-Identity* in the *sl-PathSwitchConfig*;

- 2> start timer T420 for the corresponding target L2 U2N Relay UE with the timer value set to *T420*, as included in the *sl-PathSwitchConfig*;
- 2> apply the value of the *newUE-Identity* as the C-RNTI;
- 2> indicate to upper layer (to trigger the PC5 unicast link establishment) with the target L2 U2N Relay UE indicated by the *targetRelayUE-Identity*;
- 2> apply the default configuration of SL-RLC1 as defined in 9.2.4 for SRB1;
- 1> else (*sl-PathSwitchConfig* is not included):
 - 2> if this procedure is executed for the MCG or if this procedure is executed for an SCG not indicated as deactivated in the E-UTRA or NR RRC message in which the *RRCReconfiguration* message is embedded:
 - 3> start timer T304 for the corresponding SpCell with the timer value set to *t304*, as included in the *reconfigurationWithSync*;
 - 2> if the *frequencyInfoDL* is included:
 - 3> consider the target SpCell to be one on the SSB frequency indicated by the *frequencyInfoDL* with a physical cell identity indicated by the *physCellId*;
 - 2> else:
 - 3> consider the target SpCell to be one on the SSB frequency of the source SpCell with a physical cell identity indicated by the *physCellId*;
 - 2> start synchronising to the DL of the target SpCell;
 - 2> apply the specified BCCH configuration defined in 9.1.1.1 for the target SpCell;
 - 2> acquire the MIB of the target SpCell, which is scheduled as specified in TS 38.213 [13];
- NOTE 1: The UE should perform the reconfiguration with sync as soon as possible following the reception of the RRC message triggering the reconfiguration with sync, which could be before confirming successful reception (HARQ and ARQ) of this message.
- NOTE 2: The UE may omit reading the *MIB* if the UE already has the required timing information, or the timing information is not needed for random access.
- NOTE 2a: A UE with DAPS bearer does not monitor for system information updates in the source PCell.
 - 2> If any DAPS bearer is configured:
 - 3> create a MAC entity for the target cell group with the same configuration as the MAC entity for the source cell group;
 - 3> for each DAPS bearer:
 - 4> establish an RLC entity or entities for the target cell group, with the same configurations as for the source cell group;
 - 4> establish the logical channel for the target cell group, with the same configurations as for the source cell group;
- NOTE 2b:In order to understand if a DAPS bearer is configured, the UE needs to check the presence of the field daps-Config within the RadioBearerConfig IE received in radioBearerConfig or radioBearerConfig2.
 - 3> for each SRB:
 - 4> establish an RLC entity for the target cell group, with the same configurations as for the source cell group;
 - 4> establish the logical channel for the target cell group, with the same configurations as for the source cell group;

3> suspend SRBs for the source cell group;

NOTE 3: Void

- 3> apply the value of the *newUE-Identity* as the C-RNTI in the target cell group;
- 3> configure lower layers for the target SpCell in accordance with the received spCellConfigCommon;
- 3> configure lower layers for the target SpCell in accordance with any additional fields, not covered in the previous, if included in the received *reconfigurationWithSync*.

2> else:

- 3> reset the MAC entity of this cell group;
- 3> consider the SCell(s) of this cell group, if configured, that are not included in the *SCellToAddModList* in the *RRCReconfiguration* message, to be in deactivated state;
- 3> apply the value of the *newUE-Identity* as the C-RNTI for this cell group;
- 3> configure lower layers in accordance with the received spCellConfigCommon;
- 3> configure lower layers in accordance with any additional fields, not covered in the previous, if included in the received *reconfigurationWithSync*.
- 2> if the UE is acting as L2 U2N Remote UE at the source side:
 - 3> indicate upper layer to trigger PC5 unicast link release.

Upon L2 U2N Relay UE receiving *reconfigurationWithSync*, it either indicates to upper layers (to trigger PC5 unicast link release) or sends Notification message to the connected L2 U2N Remote UE(s) in accordance with 5.8.9.10.

5.3.5.5.3 RLC bearer release

The UE shall:

- 1> for each logicalChannelIdentity/LogicalChannelIdentityExt value included in the rlc-BearerToReleaseList/rlc-BearerToReleaseListExt that is part of the current UE configuration within the same cell group (LCH release); or
- 1> for each logicalChannelIdentity value that is to be released as the result of an SCG release according to 5.3.5.4:
 - 2> release the RLC entity or entities as specified in TS 38.322 [4], clause 5.1.3;
 - 2> release the corresponding logical channel.

5.3.5.5.4 RLC bearer addition/modification

For each *RLC-BearerConfig* received in the *rlc-BearerToAddModList* IE the UE shall:

- 1> if the UE's current configuration contains an RLC bearer with the received *logicalChannelIdentity/LogicalChannelIdentityExt* within the same cell group:
 - 2> if the RLC bearer is associated with an DAPS bearer, or
 - 2> if any DAPS bearer is configured and the RLC bearer is associated with an SRB:
 - 3> reconfigure the RLC entity or entities for the target cell group in accordance with the received *rlc-Config*;
 - 3> reconfigure the logical channel for the target cell group in accordance with the received *mac-LogicalChannelConfig*;

2> else:

- 3> if reestablishRLC is received:
 - 4> re-establish the RLC entity as specified in TS 38.322 [4];

- 3> reconfigure the RLC entity or entities in accordance with the received *rlc-Config*;
- 3> reconfigure the logical channel in accordance with the received *mac-LogicalChannelConfig*;
- 3> if servedMBS-RadioBearer is received:
 - 4> associate this logical channel with the PDCP entity identified by servedMBS-RadioBearer;
- NOTE 1: For DRB and SRB, the network does not re-associate an already configured logical channel with another radio bearer. Hence, *servedRadioBearer* is not present in this case. For MRB, the network does not re-associate an already configured logical channel with DRB or SRB or another MRB (i.e. MRB with another PDCP entity). Hence *multicastRLC-BearerConfig* is not present in this case.
- NOTE 2: In DAPS handover, the UE may perform RLC entity re-establishment (if *reestablishRLC* is set) for an RLC bearer associated with a non-DAPS bearer when indication of successful completion of random access towards target cell is received from lower layers as specified in TS 38.321 [3].
- 1> else (a logical channel with the given *logicalChannelIdentity/LogicalChannelIdentityExt* is not configured within the same cell group, including the case when full configuration option is used):
 - 2> if the servedRadioBearer associates the logical channel with an SRB and rlc-Config is not included:
 - 3> establish an RLC entity in accordance with the default configuration defined in 9.2 for the corresponding SRB;
 - 2> else:
 - 3> establish an RLC entity in accordance with the received *rlc-Config*;
 - 2> if the servedRadioBearer associates the logical channel with an SRB and if mac-LogicalChannelConfig is not included:
 - 3> configure this MAC entity with a logical channel in accordance to the default configuration defined in 9.2 for the corresponding SRB;
 - 2> else:
 - 3> configure this MAC entity with a logical channel in accordance to the received *mac-LogicalChannelConfig*;
 - 2> associate this logical channel with the PDCP entity identified by servedRadioBearer or servedMBS-RadioBearer.

5.3.5.5.5 MAC entity configuration

- 1> if SCG MAC is not part of the current UE configuration (i.e. SCG establishment):
 - 2> create an SCG MAC entity;
- 1> if any DAPS bearer is configured:
 - 2> reconfigure the MAC main configuration for the target cell group in accordance with the received *mac-CellGroupConfig* excluding *tag-ToReleaseList* and *tag-ToAddModList*;
- 1> else:
 - 2> reconfigure the MAC main configuration of the cell group in accordance with the received *mac-CellGroupConfig* excluding *tag-ToReleaseList* and *tag-ToAddModList*;
- 1> if the received *mac-CellGroupConfig* includes the *tag-ToReleaseList*:
 - 2> for each TAG-Id value included in the tag-ToReleaseList that is part of the current UE configuration:
 - 3> release the TAG indicated by TAG-Id;

- 1> if the received *mac-CellGroupConfig* includes the *tag-ToAddModList*:
 - 2> for each *tag-Id* value included in *tag-ToAddModList* that is not part of the current UE configuration (TAG addition):
 - 3> add the TAG, corresponding to the tag-Id, in accordance with the received timeAlignmentTimer;
 - 2> for each *tag-Id* value included in *tag-ToAddModList* that is part of the current UE configuration (TAG modification):
 - 3> reconfigure the TAG, corresponding to the tag-Id, in accordance with the received timeAlignmentTimer.

5.3.5.5.6 RLF Timers & Constants configuration

The UE shall:

- 1> if the received *rlf-TimersAndConstants* is set to *release*:
 - 2> if any DAPS bearer is configured:
 - 3> use values for timers T301, T310, T311 and constants N310, N311 for the target cell group, as included in *ue-TimersAndConstants* received in *SIB1*;
 - 2> else:
 - 3> use values for timers T301, T310, T311 and constants N310, N311, as included in *ue-TimersAndConstants* received in *SIB1*;
- 1> else:
 - 2> if any DAPS bearer is configured:
 - 3> configure the value of timers and constants for the target cell group in accordance with received rlf-TimersAndConstants;
 - 2> else:
 - 3> (re-)configure the value of timers and constants in accordance with received rlf-TimersAndConstants;
 - 3> stop timer T310 for this cell group, if running;
 - 3> stop timer T312 for this cell group, if running;
 - 3> reset the counters N310 and N311.

5.3.5.5.7 SpCell Configuration

- 1> if the UE is acting as L2 U2N Remote UE:
 - 2> if the SpCellConfig contains the rlf-TimersAndConstants which is set to setup:
 - 3> use value for timers T311 as received in *rlf-TimersAndConstants*;
 - 2> else if *rlf-TimersAndConstants* is not configured for this cell group or *SpCellConfig* contains the *rlf-TimersAndConstants* which is set to *release*:
 - 3> use value for timers T311, as included in *ue-TimersAndConstants* received in *SIB1*;
- 1> else
 - 2> if the *SpCellConfig* contains the *rlf-TimersAndConstants*:
 - 3> configure the RLF timers and constants for this cell group as specified in 5.3.5.5.6;
 - 2> else if *rlf-TimersAndConstants* is not configured for this cell group:

- 3> if any DAPS bearer is configured:
 - 4> use values for timers T301, T310, T311 and constants N310, N311 for the target cell group, as included in *ue-TimersAndConstants* received in *SIB1*;
- 3> else
 - 4> use values for timers T301, T310, T311 and constants N310, N311, as included in *ue-TimersAndConstants* received in *SIB1*;
- 2> if the SpCellConfig contains spCellConfigDedicated:
 - 3> configure the SpCell in accordance with the *spCellConfigDedicated*;
 - 3> consider the bandwidth part indicated in *firstActiveUplinkBWP-Id*, if included in the *spCellConfigDedicated*, to be the active uplink bandwidth part;
 - 3> if the *firstActiveDownlinkBWP-Id* is included in the *spCellConfigDedicated*:
 - 4> if the *SpCellConfig* is included in an *RRCReconfiguration* message contained in an NR or E-UTRA RRC message indicating that the SCG is deactivated:
 - 5> consider the bandwidth part indicated in *firstActiveDownlinkBWP-Id* to be the bandwidth part for Radio Link Monitoring, Beam Failure Detection and measurements;
 - 4> else:
 - 5> consider the bandwith part indicated in *firstActiveDownlinkBWP-Id* to be the active downlink bandwidth part;
 - 3> if any of the reference signal(s) that are used for radio link monitoring are reconfigured by the received spCellConfigDedicated:
 - 4> stop timer T310 for the corresponding SpCell, if running;
 - 4> stop timer T312 for the corresponding SpCell, if running;
 - 4> reset the counters N310 and N311.
- 1> if the SpCellConfig contains the lowMobilityEvaluationConnected:
 - 2> the UE may perform the evaluation of the low mobility criterion for this cell group as specified in 5.7.13.1;
- 1> if the *SpCellConfig* contains the *goodServingCellEvaluationRLM*:
 - 2> the UE may perform the evaluation of the good serving cell quality criterion for this SpCell as specified in 5.7.13.2;
- 1> if the SpCellConfig contains the goodServingCellEvaluationBFD:
 - 2> the UE may perform the evaluation of the good serving cell quality criterion for this serving cell as specified in 5.7.13.2;

5.3.5.5.8 SCell Release

- 1> if the release is triggered by reception of the *sCellToReleaseList*:
 - 2> for each sCellIndex value included in the sCellToReleaseList:
 - 3> if the current UE configuration includes an SCell with value sCellIndex:
 - 4> release the SCell.

5.3.5.5.9 SCell Addition/Modification

The UE shall:

- 1> for each *sCellIndex* value included in the *sCellToAddModList* that is not part of the current UE configuration (SCell addition):
 - 2> add the SCell, corresponding to the *sCellIndex*, in accordance with the *sCellConfigCommon* and *sCellConfigDedicated*;
 - 2> if the *sCellState* is included:
 - 3> configure lower layers to consider the SCell to be in activated state;
 - 2> else:
 - 3> configure lower layers to consider the SCell to be in deactivated state;
 - 2> for each *measId* included in the *measIdList* within *VarMeasConfig*:
 - 3> if SCells are not applicable for the associated measurement; and
 - 3> if the concerned SCell is included in *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*:
 - 4> remove the concerned SCell from *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 2> if the *SCellConfig* contains the *goodServingCellEvaluationBFD*:
 - 3> the UE may perform the evaluation of the good serving cell quality criterion for this serving cell as specified in 5.7.13.2.
- 1> for each *sCellIndex* value included in the *sCellToAddModList* that is part of the current UE configuration (SCell modification):
 - 2> modify the SCell configuration in accordance with the sCellConfigDedicated;
 - 2> if the *sCellState* is included:
 - 3> configure lower layers to consider the SCell to be in activated state;
 - 2> else:
 - 3> configure lower layers to consider the SCell to be in deactivated state.
 - 2> if the SCellConfig contains the goodServingCellEvaluationBFD:
 - 3> the UE may perform the evaluation of the good serving cell quality criterion for this serving cell as specified in 5.7.13.2.

5.3.5.5.10 BH RLC channel release

The IAB-node shall:

- 1> for each *BH-RLC-ChannelID* value included in the *bh-RLC-ChannelToReleaseList* that is part of the current IAB-node configuration within the same cell group (LCH release); or
- 1> for each BH-RLC-ChannelID value that is to be released as the result of an SCG release according to 5.3.5.4:
 - 2> release the RLC entity or entities as specified in TS 38.322 [4], clause 5.1.3;
 - 2> release the corresponding logical channel.

5.3.5.5.11 BH RLC channel addition/modification

For each BH-RLC-ChannelConfig received in the bh-RLC-ChannelToAddModList IE the IAB-node shall:

- 1> if the current configuration contains a BH RLC Channel with the received *bh-RLC-ChannelID* within the same cell group:
 - 2> if reestablishRLC is received:
 - 3> re-establish the RLC entity as specified in TS 38.322 [4];
 - 2> reconfigure the RLC entity or entities in accordance with the received *rlc-Config*;
 - 2> reconfigure the logical channel in accordance with the received mac-LogicalChannelConfig;
- 1> else (a backhaul logical channel with the given *BH-RLC-ChannelID* was not configured before within the same cell group):
 - 2> establish an RLC entity in accordance with the received *rlc-Config*;
 - 2> configure this MAC entity with a logical channel in accordance to the received mac-LogicalChannelConfig.

5.3.5.5.12 Uu Relay RLC channel release

The L2 U2N Relay UE shall:

- 1> for each *Uu-RelayRLC-ChannelID* value included in the *uu-RelayRLC-ChannelToReleaseList* that is part of the current configuration within the same cell group (LCH release):
 - 2> release the RLC entity as specified in TS 38.322 [4], clause 5.1.3;
 - 2> release the corresponding logical channel.

5.3.5.5.13 Uu Relay RLC channel addition/modification

For each *Uu-RelayRLC-ChannelConfig* received in the *uu-RelayRLC-ChannelToAddModList* the L2 U2N Relay UE shall:

- 1> if the current configuration contains a Uu Relay RLC channel with the same *uu-RelayRLC-ChannelID* within the same cell group:
 - 2> if reestablishRLC is received:
 - 3> re-establish the RLC entity as specified in TS 38.322 [4];
 - 2> reconfigure the RLC entity in accordance with the received *rlc-Config*;
 - 2> reconfigure the logical channel in accordance with the received mac-LogicalChannelConfig;
- 1> else (a logical channel with the given *uu-RelayRLC-ChannelID* was not configured before within the same cell group):
 - 2> establish an RLC entity in accordance with the received *rlc-Config*;
 - 2> configure this MAC entity with a logical channel in accordance to the received mac-LogicalChannelConfig.

5.3.5.6 Radio Bearer configuration

5.3.5.6.1 General

The UE shall perform the following actions based on a received RadioBearerConfig IE:

- 1> if the RadioBearerConfig includes the srb3-ToRelease or srb4-ToRelease:
 - 2> perform the SRB release as specified in 5.3.5.6.2;
- 1> if the RadioBearerConfig includes the srb-ToAddModList or if any DAPS bearer is configured:
 - 2> perform the SRB addition or reconfiguration as specified in 5.3.5.6.3;

- 1> if the *RadioBearerConfig* includes the *drb-ToReleaseList*:
 - 2> perform DRB release as specified in 5.3.5.6.4;
- 1> if the RadioBearerConfig includes the drb-ToAddModList:
 - 2> perform DRB addition or reconfiguration as specified in 5.3.5.6.5;
- 1> if the RadioBearerConfig includes the mrb-ToReleaseList:
 - 2> perform multicast MRB release as specified in 5.3.5.6.6;
- 1> if the RadioBearerConfig includes the mrb-ToAddModList:
 - 2> perform multicast MRB addition or reconfiguration as specified in 5.3.5.6.7;
- 1> release all SDAP entities, if any, that have no associated DRB as specified in TS 37.324 [24] clause 5.1.2, and indicate the release of the user plane resources for PDU Sessions associated with the released SDAP entities to upper layers;
- 1> release all SDAP entities that have no associated multicast MRB as specified in TS 37.324 [24] clause 5.1.2, and indicate the release of user plane resources for these MBS multicast sessions to upper layers.

5.3.5.6.2 SRB release

The UE shall:

- 1> if srb3-ToRelease is included:
 - 2> release the PDCP entity and the *srb-Identity* of the SRB3;
- 1> if srb4-ToRelease is included
 - 2> release the PDCP entity and the srb-Identity of the SRB4.

5.3.5.6.3 SRB addition/modification

- 1> If any DAPS bearer is configured, for each SRB:
 - 2> establish a PDCP entity for the target cell group as specified in TS 38.323 [5], with the same configuration as the PDCP entity for the source cell group;
 - 2> if the *masterKeyUpdate* is received:
 - 3> configure the PDCP entity with the security algorithms according to securityConfig and apply the keys $(K_{RRCenc} \text{ and } K_{RRCint})$ associated with the master key (K_{gNB}) ;
 - 2> else:
 - 3> configure the PDCP entity for the target cell group with state variables continuation as specified in TS 38.323 [5], and with the same security configuration as the PDCP entity for the source cell group;
- 1> for each *srb-Identity* value included in the *srb-ToAddModList* that is not part of the current UE configuration (SRB establishment or reconfiguration from E-UTRA PDCP to NR PDCP):
 - 2> establish a PDCP entity;
 - 2> if AS security has been activated:
 - 3> if target RAT of handover is E-UTRA/5GC; or
 - 3> if the UE is connected to E-UTRA/5GC:
 - 4> if the UE is capable of E-UTRA/5GC, but not capable of NGEN-DC:

- 5> configure the PDCP entity with the security algorithms and keys (K_{RRCenc} and K_{RRCint}) configured/derived as specified in TS 36.331 [10];
- 4> else (i.e., UE capable of NGEN-DC):
 - 5> configure the PDCP entity with the security algorithms according to *securityConfig* and apply the keys (K_{RRCenc} and K_{RRCint}) associated with the master key (K_{eNB}) or secondary key (S-K_{gNB}) as indicated in *keyToUse*, if applicable;
- 3> else (i.e., UE connected to NR or UE connected to E-UTRA/EPC):
 - 4> configure the PDCP entity with the security algorithms according to *securityConfig* and apply the keys (K_{RRCenc} and K_{RRCint}) associated with the master key (K_{eNB}/ K_{gNB}) or secondary key (S-K_{gNB}) as indicated in *keyToUse*, if applicable;
- 2> if the current UE configuration as configured by E-UTRA in TS 36.331 [10] includes an SRB identified with the same *srb-Identity* value:
 - 3> associate the E-UTRA RLC entity and DCCH of this SRB with the NR PDCP entity;
 - 3> release the E-UTRA PDCP entity of this SRB;
- 2> if the *pdcp-Config* is included:
 - 3> configure the PDCP entity in accordance with the received pdcp-Config;
- 2 > else
 - 3> configure the PDCP entity in accordance with the default configuration defined in 9.2.1 for the corresponding SRB;
- 1> if any DAPS bearer is configured, for each *srb-Identity* value included in the *srb-ToAddModList* that is part of the current UE configuration:
 - 2> if the *pdcp-Config* is included:
 - 3> reconfigure the PDCP entity for the target cell group in accordance with the received *pdcp-Config*;
- 1> else, for each srb-Identity value included in the srb-ToAddModList that is part of the current UE configuration:
 - 2> if the reestablishPDCP is set:
 - 3> if target RAT of handover is E-UTRA/5GC; or
 - 3> if the UE is connected to E-UTRA/5GC:
 - 4> if the UE is capable of E-UTRA/5GC, but not capable of NGEN-DC:
 - 5> configure the PDCP entity to apply the integrity protection algorithm and K_{RRCint} key configured/derived as specified in TS 36.331 [10], i.e. the integrity protection configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
 - 5> configure the PDCP entity to apply the ciphering algorithm and K_{RRCenc} key configured/derived as specified in TS 36.331 [10], i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
 - 4> else (i.e., a UE capable of NGEN-DC):
 - 5> configure the PDCP entity to apply the integrity protection algorithm and K_{RRCint} key associated with the master key (K_{eNB}) or secondary key (S-K_{gNB}), as indicated in *keyToUse*, i.e. the integrity protection configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
 - 5> configure the PDCP entity to apply the ciphering algorithm and K_{RRCenc} key associated with the master key (K_{eNB}) or secondary key (S-K_{gNB}) as indicated in *keyToUse*, i.e. the ciphering

configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

- 3> else (i.e., UE connected to NR or UE in EN-DC):
 - 4> configure the PDCP entity to apply the integrity protection algorithm and K_{RRCint} key associated with the master key (K_{eNB}/K_{gNB}) or secondary key ($S-K_{gNB}$), as indicated in keyToUse, i.e. the integrity protection configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
 - 4> configure the PDCP entity to apply the ciphering algorithm and K_{RRCenc} key associated with the master key (K_{eNB}/K_{gNB}) or secondary key (S-K_{gNB}) as indicated in *keyToUse*, i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
- 3> re-establish the PDCP entity of this SRB as specified in TS 38.323 [5];
- 2> else, if the *discardOnPDCP* is set:
 - 3> trigger the PDCP entity to perform SDU discard as specified in TS 38.323 [5];
- 2> if the *pdcp-Config* is included:
 - 3> reconfigure the PDCP entity in accordance with the received *pdcp-Config*.

5.3.5.6.4 DRB release

The UE shall:

- 1> for each drb-Identity value included in the drb-ToReleaseList that is part of the current UE configuration; or
- 1> for each *drb-Identity* value that is to be released as the result of full configuration according to 5.3.5.11:
 - 2> release the PDCP entity and the *drb-Identity*;
 - 2> if SDAP entity associated with this DRB is configured:
 - 3> indicate the release of the DRB to SDAP entity associated with this DRB (TS 37.324 [24], clause 5.3.3);
 - 2> if the DRB is associated with an *eps-BearerIdentity*:
 - 3> if a new bearer is not added either with NR or E-UTRA with same eps-BearerIdentity:
 - 4> indicate the release of the DRB and the *eps-BearerIdentity* of the released DRB to upper layers.
- NOTE 1: The UE does not consider the message as erroneous if the *drb-ToReleaseList* includes any *drb-Identity* value that is not part of the current UE configuration.
- NOTE 2: Whether or not the RLC and MAC entities associated with this PDCP entity are reset or released is determined by the *CellGroupConfig*.

5.3.5.6.5 DRB addition/modification

- 1> for each *drb-Identity* value included in the *drb-ToAddModList* that is not part of the current UE configuration (DRB establishment including the case when full configuration option is used):
 - 2> establish a PDCP entity and configure it in accordance with the received *pdcp-Config*;
 - 2> if the PDCP entity of this DRB is not configured with *cipheringDisabled*:
 - 3> if target RAT of handover is E-UTRA/5GC; or
 - 3> if the UE is connected to E-UTRA/5GC:

- 4> if the UE is capable of E-UTRA/5GC but not capable of NGEN-DC:
 - 5> configure the PDCP entity with the ciphering algorithm and K_{UPenc} key configured/derived as specified in TS 36.331 [10];
- 4> else (i.e., a UE capable of NGEN-DC):
 - 5> configure the PDCP entity with the ciphering algorithms according to *securityConfig* and apply the key (K_{UPenc}) associated with the master key (K_{eNB}) or secondary key (S-K_{gNB}) as indicated in *keyToUse*, if applicable;
- 3> else (i.e., UE connected to NR or UE connected to E-UTRA/EPC):
 - 4> configure the PDCP entity with the ciphering algorithms according to *securityConfig* and apply the K_{UPenc} key associated with the master key (K_{eNB}/K_{gNB}) or the secondary key ($S-K_{gNB}/S-K_{eNB}$) as indicated in keyToUse;
- 2> if the PDCP entity of this DRB is configured with *integrityProtection*:
 - 3> configure the PDCP entity with the integrity protection algorithms according to *securityConfig* and apply the K_{UPint} key associated with the master (K_{eNB}/K_{gNB}) or the secondary key (S-K_{gNB}) as indicated in *keyToUse*;
- 2> if an sdap-Config is included:
 - 3> if an SDAP entity with the received *pdu-Session* does not exist:
 - 4> establish an SDAP entity as specified in TS 37.324 [24] clause 5.1.1;
 - 4> if an SDAP entity with the received *pdu-Session* did not exist prior to receiving this reconfiguration:
 - 5> indicate the establishment of the user plane resources for the *pdu-Session* to upper layers;
 - 3> configure the SDAP entity in accordance with the received *sdap-Config* as specified in TS 37.324 [24] and associate the DRB with the SDAP entity;
 - 3> for each QFI value added in *mappedQoS-FlowsToAdd*, if the QFI value is previously configured, the QFI value is released from the old DRB;
- 2> if the DRB is associated with an eps-BearerIdentity:
 - 3> if the DRB was configured with the same *eps-BearerIdentity* either by NR or E-UTRA prior to receiving this reconfiguration:
 - 4> associate the established DRB with the corresponding eps-BearerIdentity;
 - 3> else:
 - 4> indicate the establishment of the DRB(s) and the *eps-BearerIdentity* of the established DRB(s) to upper layers;
- 1> for each *drb-Identity* value included in the *drb-ToAddModList* that is part of the current UE configuration and configured as DAPS bearer:
 - 2> reconfigure the PDCP entity to configure DAPS with the ciphering function, integrity protection function and ROHC function of the target cell group as specified in TS 38.323 [5] and configure it in accordance with the received *pdcp-Config*;
 - 2> if the *masterKeyUpdate* is received:
 - 3> if the ciphering function of the target cell group PDCP entity is not configured with *cipheringDisabled*:
 - 4> configure the ciphering function of the target cell group PDCP entity with the ciphering algorithm according to *securityConfig* and apply the K_{UPenc} key associated with the master key (K_{gNB}), as indicated in *keyToUse*, i.e. the ciphering configuration shall be applied to all subsequent PDCP PDUs received from the target cell group and sent to the target cell group by the UE;

- 3> if the integrity protection function of the target cell group PDCP entity is configured with *integrityProtection*:
 - 4> configure the integrity protection function of the target cell group PDCP entity with the integrity protection algorithms according to *securityConfig* and apply the K_{UPint} key associated with the master key (K_{gNB}) as indicated in *keyToUse*;

2> else:

- 3> configure the ciphering function and the integrity protection function of the target cell group PDCP entity with the same security configuration as the PDCP entity for the source cell group;
- 2> if the *sdap-Config* is included and when indication of successful completion of random access towards target cell is received from lower layers as specified in [3]:
 - 3> reconfigure the SDAP entity in accordance with the received sdap-Config as specified in TS 37.324 [24];
 - 3> for each QFI value added in *mappedQoS-FlowsToAdd*, if the QFI value is previously configured, the QFI value is released from the old DRB;
- 1> for each *drb-Identity* value included in the *drb-ToAddModList* that is part of the current UE configuration and not configured as DAPS bearer:
 - 2> if the reestablishPDCP is set:
 - 3> if target RAT of handover is E-UTRA/5GC; or
 - 3> if the UE is connected to E-UTRA/5GC:
 - 4> if the UE is capable of E-UTRA/5GC but not capable of NGEN-DC:
 - 5> if the PDCP entity of this DRB is not configured with *cipheringDisabled*:
 - 6> configure the PDCP entity with the ciphering algorithm and K_{UPenc} key configured/derived as specified in TS 36.331 [10], clause 5.4.2.3, i.e. the ciphering configuration shall be applied to all subsequent PDCP PDUs received and sent by the UE;
 - 4> else (i.e., a UE capable of NGEN-DC):
 - 5> if the PDCP entity of this DRB is not configured with *cipheringDisabled*:
 - 6> configure the PDCP entity with the ciphering algorithm and K_{UPenc} key associated with the master key (K_{eNB}) or the secondary key (S-K_{gNB}), as indicated in *keyToUse*, i.e. the ciphering configuration shall be applied to all subsequent PDCP PDUs received and sent by the UE;
 - 3> else (i.e., UE connected to NR or UE connected to E-UTRA/EPC (in EN-DC or capable of EN-DC)):
 - 4> if the PDCP entity of this DRB is not configured with *cipheringDisabled*:
 - 5> configure the PDCP entity with the ciphering algorithm and K_{UPenc} key associated with the master key (K_{eNB}/K_{gNB}) or the secondary key ($S-K_{gNB}/S-K_{eNB}$), as indicated in *keyToUse*, i.e. the ciphering configuration shall be applied to all subsequent PDCP PDUs received and sent by the UE;
 - 4> if the PDCP entity of this DRB is configured with *integrityProtection*:
 - 5> configure the PDCP entity with the integrity protection algorithms according to *securityConfig* and apply the K_{UPint} key associated with the master key (K_{eNB}/K_{gNB}) or the secondary key ($S-K_{gNB}$) as indicated in keyToUse;
 - 3> if *drb-ContinueROHC* is included in *pdcp-Config*:
 - 4> indicate to lower layer that *drb-ContinueROHC* is configured;
 - 3> if *drb-ContinueEHC-DL* is included in *pdcp-Config*:
 - 4> indicate to lower layer that *drb-ContinueEHC-DL* is configured;

- 3> if *drb-ContinueEHC-UL* is included in *pdcp-Config*:
 - 4> indicate to lower layer that *drb-ContinueEHC-UL* is configured;
- 3> if *drb-ContinueUDC* is included in *pdcp-Config*:
 - 4> indicate to lower layer that *drb-ContinueUDC* is configured;
- 3> re-establish the PDCP entity of this DRB as specified in TS 38.323 [5], clause 5.1.2;
- 2> else, if the *recoverPDCP* is set:
 - 3> trigger the PDCP entity of this DRB to perform data recovery as specified in TS 38.323 [5];
- 2> if the *pdcp-Config* is included:
 - 3> reconfigure the PDCP entity in accordance with the received *pdcp-Config*.
- 2> if the *sdap-Config* is included:
 - 3> reconfigure the SDAP entity in accordance with the received sdap-Config as specified in TS37.324 [24];
 - 3> for each QFI value added in *mappedQoS-FlowsToAdd*, if the QFI value is previously configured, the QFI value is released from the old DRB;
- NOTE 1: Void.
- NOTE 2: When determining whether a *drb-Identity* value is part of the current UE configuration, the UE does not distinguish which *RadioBearerConfig* and *DRB-ToAddModList* that DRB was originally configured in. To re-associate a DRB with a different key (K_{eNB} to S-K_{gNB}, K_{gNB} to S-K_{eNB}, K_{gNB} to S-K_{gNB}, or vice versa), the network provides the *drb-Identity* value in the (target) *drb-ToAddModList* and sets the *reestablishPDCP* flag. The network does not list the *drb-Identity* in the (source) *drb-ToReleaseList*.
- NOTE 3: When setting the *reestablishPDCP* flag for a radio bearer, the network ensures that the RLC receiver entities do not deliver old PDCP PDUs to the re-established PDCP entity. It does that e.g. by triggering a reconfiguration with sync of the cell group hosting the old RLC entity or by releasing the old RLC entity.
- NOTE 4: In this specification, UE configuration refers to the parameters configured by NR RRC unless otherwise stated.
- NOTE 5: Ciphering and integrity protection can be enabled or disabled for a DRB. The enabling/disabling of ciphering or integrity protection can be changed only by releasing and adding the DRB.
- NOTE 6: In DAPS handover, the UE may perform PDCP entity re-establishment (if *reestablishPDCP* is set) or the PDCP data recovery (if *recoverPDCP* is set) for a non-DAPS bearer when indication of successful completion of random access towards target cell is received from lower layers as specified in TS 38.321 [3]. In this case, the UE suspends data transmission and reception for all non-DAPS bearers in the source MCG for duration of the DAPS handover.

5.3.5.6.6 Multicast MRB release

- 1> for each mrb-Identity value included in the mrb-ToReleaseList that is part of the current UE configuration; or
- 1> for each *mrb-Identity* value that is to be released as the result of full configuration according to 5.3.5.11:
 - 2> release the PDCP entity and the *mrb-Identity*;
 - 2> if there is no other multicast MRB configured with the same *mbs-SessionId* as configured for the released multicast MRB:
 - 3> indicate the release of the user plane resources for the *mbs-SessionId* to upper layers.
- NOTE 1: The UE does not consider the message as erroneous if the *mrb-ToReleaseList* includes any *mrb-Identity* value that is not part of the current UE configuration.

NOTE 2: Whether or not the RLC and MAC entities associated with this PDCP entity are reset or released is determined by the *CellGroupConfig*.

5.3.5.6.7 Multicast MRB addition/modification

The UE shall for each element in the order of entry in the list *mrb-ToAddModList*:

- 1> if mrb-Identity value included in the mrb-ToAddModList is part of the UE configuration:
 - 2> if *mrb-Identity* value included in the *mrb-ToAddModList* for which *mrb-IdentityNew* is included (i.e., multicast MRB ID change):
 - 3> update the *mrb-Identity* to the value *mrb-IdentityNew*;
 - 2> if the reestablishPDCP is set:
 - 3> if *drb-ContinueROHC* is included in *pdcp-Config*:
 - 4> indicate to lower layer that *drb-ContinueROHC* is configured;
 - 3> if *drb-ContinueEHC-DL* is included in *pdcp-Config*:
 - 4> indicate to lower layer that *drb-ContinueEHC-DL* is configured;
 - 3> re-establish the PDCP entity of this multicast MRB as specified in TS 38.323 [5], clause 5.1.2;
 - 2> else, if the *recoverPDCP* is set:
 - 3> trigger the PDCP entity of this MRB to perform data recovery as specified in TS 38.323 [5];
 - 2> if the *pdcp-Config* is included:
 - 3> reconfigure the PDCP entity in accordance with the received *pdcp-Config*;
- 1> else if *mrb-Identity* value included in the *mrb-ToAddModList* is not part of the UE configuration (i.e., multicast MRB establishment including the case when full configuration option is used):
 - 2> establish a PDCP entity and configure it in accordance with the received *pdcp-Config*;
 - 2> associate the established multicast MRB with the corresponding mbs-SessionId;
 - 2> if an SDAP entity with the received mbs-SessionId does not exist:
 - 3> establish an SDAP entity as specified in TS 37.324 [24] clause 5.1.1;
 - 3> if an SDAP entity with the received *mbs-SessionId* did not exist prior to receiving this reconfiguration:
 - 4> indicate the establishment of the user plane resources for the *mbs-SessionId* to upper layers.
- NOTE 1: When setting the *reestablishPDCP* flag for a radio bearer, the network ensures that the RLC receiver entities do not deliver old PDCP PDUs to the re-established PDCP entity. The network does that e.g. by triggering a reconfiguration with sync of the cell group hosting the old RLC entity or by releasing the old RLC entity.
- NOTE 2: In this specification, UE configuration refers to the parameters configured by NR RRC unless otherwise stated.
- NOTE 3: When updating the *mrb-Identity*, the network ensures new MRBs are listed at the end of the *mrb-ToAddModList* if they have the same MRB ID as in the existing UE configuration.

5.3.5.7 AS Security key update

- 1> if UE is connected to E-UTRA/EPC or E-UTRA/5GC:
 - 2> upon reception of *sk-Counter* as specified in TS 36.331 [10]:

- 3> update the S-K_{gNB} key based on the K_{eNB} key and using the received *sk-Counter* value, as specified in TS 33.401 [30] for EN-DC, or TS 33.501 [11] for NGEN-DC;
- 3> derive the K_{RRCenc} and K_{UPenc} keys as specified in TS 33.401 [30] for EN-DC, or TS 33.501 [11] for NGEN-DC;
- 3> derive the K_{RRCint} and K_{UPint} keys as specified in TS 33.401 [30] for EN-DC or TS 33.501 [11] for NGEN-DC
- 1> else if this procedure was initiated due to reception of the *masterKeyUpdate*:
 - 2> if the *nas-Container* is included in the received *masterKeyUpdate*:
 - 3> forward the *nas-Container* to the upper layers;
 - 2> if the keySetChangeIndicator is set to true:
 - 3> derive or update the K_{gNB} key based on the K_{AMF} key, as specified in TS 33.501 [11];
 - 2> else:
 - 3> derive or update the K_{gNB} key based on the current K_{gNB} key or the NH, using the *nextHopChainingCount* value indicated in the received *masterKeyUpdate*, as specified in TS 33.501 [11];
 - 2> store the *nextHopChainingCount* value;
 - 2> derive the keys associated with the K_{gNB} key as follows:
 - 3> if the securityAlgorithmConfig is included in SecurityConfig:
 - 4> derive the K_{RRCenc} and K_{UPenc} keys associated with the *cipheringAlgorithm* indicated in the *securityAlgorithmConfig*, as specified in TS 33.501 [11];
 - 4> derive the K_{RRCint} and K_{UPint} keys associated with the *integrityProtAlgorithm* indicated in the *securityAlgorithmConfig*, as specified in TS 33.501 [11];
 - 3> else:
 - 4> derive the K_{RRCenc} and K_{UPenc} keys associated with the current *cipheringAlgorithm*, as specified in TS 33.501 [11];
 - 4> derive the K_{RRCint} and K_{UPint} keys associated with the current *integrityProtAlgorithm*, as specified in TS 33.501 [11].
- NOTE 1: Ciphering and integrity protection are optional to configure for the DRBs.
- 1> else if this procedure was initiated due to reception of the *sk-Counter* (UE is in NE-DC, or NR-DC, or is configured with SN terminated bearer(s)):
 - 2> derive or update the secondary key (S-K_{gNB} or S-KeNB) based on the KgNB key and using the received *sk-Counter* value, as specified in TS 33.501 [11];
 - 2> derive the K_{RRCenc} key and the K_{UPenc} key as specified in TS 33.501 [11] using the ciphering algorithms indicated in the *RadioBearerConfig* associated with the secondary key (S-K_{gNB} or S-KeNB) as indicated by keyToUse;
 - 2> derive the K_{RRCint} key and the K_{UPint} key as specified in TS 33.501 [11] using the integrity protection algorithms indicated in the *RadioBearerConfig* associated with the secondary key (S-K_{gNB} or S-KeNB) as indicated by *keyToUse*;
- NOTE 2: If the UE has no radio bearer configured with *keyToUse* set to *secondary* and receives the *sk-Counter* without any *RadioBearerConfig* with *keyToUse* set to *secondary*, the UE does not consider it as an invalid reconfiguration.

5.3.5.8 Reconfiguration failure

5.3.5.8.1 Void

5.3.5.8.2 Inability to comply with RRCReconfiguration

NOTE 00: The UE behaviour specified in this clause does not apply to the following, and the UE ignores, i.e. does not take an action on and does not store, the fields that it does not support or does not comprehend:

- The fields in ServingCellConfigCommon that are defined in Rel-16 and later.
- The fields of *searchSpaceMCCH* and *searchSpaceMTCH* in *PDCCH-ConfigCommon* that are defined in Rel-17 and later.

The UE shall:

1> if the UE is in (NG)EN-DC:

- 2> if the UE is unable to comply with (part of) the configuration included in the *RRCReconfiguration* message received over SRB3;
 - 3> if the RRCReconfiguration message was received as part of ConditionalReconfiguration:
 - 4> continue using the configuration used prior to when the inability to comply with the *RRCReconfiguration* message was detected;

3> else:

- 4> continue using the configuration used prior to the reception of RRCReconfiguration message;
- 3> if MCG transmission is not suspended:
 - 4> initiate the SCG failure information procedure as specified in clause 5.7.3 to report SCG reconfiguration error, upon which the connection reconfiguration procedure ends;

3> else:

- 4> initiate the connection re-establishment procedure as specified in TS 36.331 [10], clause 5.3.7, upon which the connection reconfiguration procedure ends;
- 2> else, if the UE is unable to comply with (part of) the configuration included in the *RRCReconfiguration* message received over SRB1;
 - 3> if the RRCReconfiguration message was received as part of ConditionalReconfiguration:
 - 4> continue using the configuration used prior to when the inability to comply with the *RRCReconfiguration* message was detected;

3> else:

- 4> continue using the configuration used prior to the reception of RRCReconfiguration message;
- 3> initiate the connection re-establishment procedure as specified in TS 36.331 [10], clause 5.3.7, upon which the connection reconfiguration procedure ends.
- 1> else if RRCReconfiguration is received via NR (i.e., NR standalone, NE-DC, or NR-DC):
 - 2> if the UE is unable to comply with (part of) the configuration included in the *RRCReconfiguration* message received over SRB3;

NOTE 0: This case does not apply in NE-DC.

- 3> if the RRCReconfiguration message was received as part of ConditionalReconfiguration:
 - 4> continue using the configuration used prior to when the inability to comply with the *RRCReconfiguration* message was detected;

- 3> else:
 - 4> continue using the configuration used prior to the reception of RRCReconfiguration message;
- 3> if MCG transmission is not suspended:
 - 4> initiate the SCG failure information procedure as specified in clause 5.7.3 to report SCG reconfiguration error, upon which the connection reconfiguration procedure ends;
- 3> else:
 - 4> initiate the connection re-establishment procedure as specified in clause 5.3.7, upon which the connection reconfiguration procedure ends;
- 2> else if the UE is unable to comply with (part of) the configuration included in the *RRCReconfiguration* message received over the SRB1 or if the upper layers indicate that the *nas-Container* is invalid:
- NOTE 0a: The compliance also covers the SCG configuration carried within octet strings e.g. field *mrdc-SecondaryCellGroupConfig*. I.e. the failure behaviour defined also applies in case the UE cannot comply with the embedded SCG configuration or with the combination of (parts of) the MCG and SCG configurations.
- NOTE 0b: The compliance also covers the V2X sidelink configuration carried within an octet string, e.g. field *sl-ConfigDedicatedEUTRA*. I.e. the failure behaviour defined also applies in case the UE cannot comply with the embedded V2X sidelink configuration.
 - 3> if the RRCReconfiguration message was received as part of ConditionalReconfiguration:
 - 4> continue using the configuration used prior to when the inability to comply with the *RRCReconfiguration* message was detected;
 - 3> else:
 - 4> continue using the configuration used prior to the reception of RRCReconfiguration message;
 - 3> if AS security has not been activated:
 - 4> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'other'
 - 3> else if AS security has been activated but SRB2 and at least one DRB or multicast MRB or, for IAB, SRB2, have not been setup:
 - 4> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'RRC connection failure';
 - 3> else:
 - 4> initiate the connection re-establishment procedure as specified in 5.3.7, upon which the reconfiguration procedure ends;
- 1> else if RRCReconfiguration is received via other RAT (Handover to NR failure):
 - 2> if the UE is unable to comply with any part of the configuration included in the *RRCReconfiguration* message or if the upper layers indicate that the *nas-Container* is invalid:
 - 3> perform the actions defined for this failure case as defined in the specifications applicable for the other RAT.
- NOTE 1: The UE may apply above failure handling also in case the *RRCReconfiguration* message causes a protocol error for which the generic error handling as defined in clause 10 specifies that the UE shall ignore the message.
- NOTE 2: If the UE is unable to comply with part of the configuration, it does not apply any part of the configuration, i.e. there is no partial success/failure.

NOTE 3: It is up to UE implementation whether the compliance check for an *RRCReconfiguration* received as part of *ConditionalReconfiguration* is performed upon the reception of the message or upon CHO, CPA and CPC execution (when the message is required to be applied).

5.3.5.8.3 T304 expiry (Reconfiguration with sync Failure) or T420 expiry (Path switch failure)

- 1> if T304 of the MCG expires; or
- 1> if T420 expires; or,
- 1> if the target L2 U2N Relay UE (i.e., the UE indicated by *targetRelayUE-Identity* in the received *RRCReconfiguration* message containing *reconfigurationWithSync* indicating path switch as specified in 5.3.5.5.2) changes its serving PCell before path switch:
 - 2> release dedicated preambles provided in rach-ConfigDedicated if configured;
 - 2> release dedicated msgA PUSCH resources provided in rach-ConfigDedicated if configured;
 - 2> if any DAPS bearer is configured, and radio link failure is not detected in the source PCell, according to clause 5.3.10.3:
 - 3> reset MAC for the target PCell and release the MAC configuration for the target PCell;
 - 3> for each DAPS bearer:
 - 4> release the RLC entity or entities as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the target PCell;
 - 4> reconfigure the PDCP entity to release DAPS as specified in TS 38.323 [5];
 - 3> for each SRB:
 - 4> if the *masterKeyUpdate* was not received:
 - 5> configure the PDCP entity for the source PCell with state variables continuation as specified in TS 38.323 [5];
 - 4> release the PDCP entity for the target PCell;
 - 4> release the RLC entity as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the target PCell;
 - 4> trigger the PDCP entity for the source PCell to perform SDU discard as specified in TS 38.323 [5];
 - 4> re-establish the RLC entity for the source PCell;
 - 3> release the physical channel configuration for the target PCell;
 - 3> discard the keys used in target PCell (the K_{gNB} key, the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key), if any;
 - 3> resume suspended SRBs in the source PCell;
 - 3> for each non-DAPS bearer:
 - 4> revert back to the UE configuration used for the DRB or multicast MRB in the source PCell, includes PDCP, RLC states variables, the security configuration and the data stored in transmission and reception buffers in PDCP and RLC entities;
 - 3> revert back to the UE measurement configuration used in the source PCell;
 - 3> store the handover failure information in VarRLF-Report as described in the clause 5.3.10.5;
 - 3> initiate the failure information procedure as specified in clause 5.7.5 to report DAPS handover failure.

- 2> else:
 - 3> revert back to the UE configuration used in the source PCell;
 - 3> if the associated T304 was not initiated upon cell selection performed while timer T311 was running, as defined in clause 5.3.7.3:
 - 4> store the handover failure information in VarRLF-Report as described in the clause 5.3.10.5;
 - 3> initiate the connection re-establishment procedure as specified in clause 5.3.7.
- NOTE 1: In the context above, "the UE configuration" includes state variables and parameters of each radio bearer.
- 1> else if T304 of a secondary cell group expires:
 - 2> if MCG transmission is not suspended:
 - 3> release dedicated preambles provided in rach-ConfigDedicated, if configured;
 - 3> release dedicated msgA PUSCH resources provided in rach-ConfigDedicated, if configured;
 - 3> initiate the SCG failure information procedure as specified in clause 5.7.3 to report SCG reconfiguration with sync failure, upon which the RRC reconfiguration procedure ends;
 - 2> else:
 - 3> if the UE is in NR-DC:
 - 4> initiate the connection re-establishment procedure as specified in clause 5.3.7;
 - 3> else (the UE is in (NG) EN-DC):
 - 4> initiate the connection re-establishment procedure as specified in TS 36.331 [10], clause 5.3.7;
- 1> else if T304 expires when RRCReconfiguration is received via other RAT (HO to NR failure):
 - 2> reset MAC;
 - 2> perform the actions defined for this failure case as defined in the specifications applicable for the other RAT.
- NOTE 2: In this clause, the term 'handover failure' has been used to refer to 'reconfiguration with sync failure'.

5.3.5.9 Other configuration

- 1> if the received *otherConfig* includes the *delayBudgetReportingConfig*:
 - 2> if *delayBudgetReportingConfig* is set to *setup*:
 - 3> consider itself to be configured to send delay budget reports in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to send delay budget reports and stop timer T342, if running.
- 1> if the received *otherConfig* includes the *overheatingAssistanceConfig*:
 - 2> if *overheatingAssistanceConfig* is set to *setup*:
 - 3> consider itself to be configured to provide overheating assistance information in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to provide overheating assistance information and stop timer T345, if running;
- 1> if the received *otherConfig* includes the *idc-AssistanceConfig*:

- 2> if *idc-AssistanceConfig* is set to *setup*:
 - 3> consider itself to be configured to provide IDC assistance information in accordance with 5.7.4;
- 2> else:
 - 3> consider itself not to be configured to provide IDC assistance information;
- 1> if the received *otherConfig* includes the *drx-PreferenceConfig*:
 - 2> if *drx-PreferenceConfig* is set to *setup*:
 - 3> consider itself to be configured to provide its preference on DRX parameters for power saving for the cell group in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to provide its preference on DRX parameters for power saving for the cell group and stop timer T346a associated with the cell group, if running;
- 1> if the received *otherConfig* includes the *maxBW-PreferenceConfig*:
 - 2> if *maxBW-PreferenceConfig* is set to *setup*:
 - 3> consider itself to be configured to provide its preference on the maximum aggregated bandwidth for power saving for the cell group in accordance with 5.7.4;
 - 3> if otherConfig includes maxBW-PreferenceConfigFR2-2:
 - 4> consider itself to be configured to provide its preference on the maximum aggregated bandwidth for FR2-2 for power saving for the cell group in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to provide its preference on the maximum aggregated bandwidth for power saving for the cell group and stop timer T346b associated with the cell group, if running;
- 1> if the received *otherConfig* includes the *maxCC-PreferenceConfig*:
 - 2> if *maxCC-PreferenceConfig* is set to *setup*:
 - 3> consider itself to be configured to provide its preference on the maximum number of secondary component carriers for power saving for the cell group in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to provide its preference on the maximum number of secondary component carriers for power saving for the cell group and stop timer T346c associated with the cell group, if running;
- 1> if the received *otherConfig* includes the *maxMIMO-LayerPreferenceConfig*:
 - 2> if maxMIMO-LayerPreferenceConfig is set to setup:
 - 3> consider itself to be configured to provide its preference on the maximum number of MIMO layers for power saving for the cell group in accordance with 5.7.4;
 - 3> if otherConfig includes maxMIMO-LayerPreferenceConfigFR2-2:
 - 4> consider itself to be configured to provide its preference on the maximum number of MIMO layers for FR2-2 for power saving for the cell group in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to provide its preference on the maximum number of MIMO layers for power saving for the cell group and stop timer T346d associated with the cell group, if running;
- 1> if the received *otherConfig* includes the *minSchedulingOffsetPreferenceConfig*:

- 2> if *minSchedulingOffsetPreferenceConfig* is set to *setup*:
 - 3> consider itself to be configured to provide its preference on the minimum scheduling offset for cross-slot scheduling for power saving for the cell group in accordance with 5.7.4;
 - 3> if otherConfig includes minSchedulingOffsetPreferenceConfigExt:
 - 4> consider itself to be configured to provide its preference on the minimum scheduling offset for 480 kHz SCS and/or 960 kHz SCS for cross-slot scheduling for power saving for the cell group in accordance with 5.7.4;

2> else:

- 3> consider itself not to be configured to provide its preference on the minimum scheduling offset for crossslot scheduling for power saving for the cell group and stop timer T346e associated with the cell group, if running;
- 1> if the received otherConfig includes the releasePreferenceConfig:
 - 2> if releasePreferenceConfig is set to setup:
 - 3> consider itself to be configured to provide assistance information to transition out of RRC_CONNECTED in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to provide assistance information to transition out of RRC_CONNECTED and stop timer T346f, if running.
- 1> if the received *otherConfig* includes the *obtainCommonLocation*:
 - 2> include available detailed location information for any subsequent measurement report or any subsequent RLF report and SCGFailureInformation;
- NOTE 1: The UE is requested to attempt to have valid detailed location information available whenever sending a measurement report for which it is configured to include available detailed location information. The UE may not succeed e.g. because the user manually disabled the GPS hardware, due to no/poor satellite coverage. Further details, e.g. regarding when to activate GNSS, are up to UE implementation.
- 1> if the received *otherConfig* includes the *btNameList*:
 - 2> if btNameList is set to setup, include available Bluetooth measurement results for any subsequent measurement report or any subsequent RLF report and SCGFailureInformation;
- 1> if the received *otherConfig* includes the *wlanNameList*:
 - 2> if wlanNameList is set to setup, include available WLAN measurement results for any subsequent measurement report or any subsequent RLF report and SCGFailureInformation;
- 1> if the received otherConfig includes the sensorNameList:
 - 2> if *sensorNameList* is set to *setup*, include available Sensor measurement results for any subsequent measurement report or any subsequent RLF report and SCGFailureInformation;
- NOTE 2: The UE is requested to attempt to have valid Bluetooth measurements, WLAN measurements and Sensor measurements whenever sending a measurement report for which it is configured to include these measurements. The UE may not succeed e.g. because the user manually disabled the WLAN or Bluetooth or Sensor hardware. Further details, e.g. regarding when to activate WLAN or Bluetooth or Sensor, are up to UE implementation.
- 1> if the received *otherConfig* includes the *sl-AssistanceConfigNR*:
 - 2> consider itself to be configured to provide configured grant assistance information for NR sidelink communication in accordance with 5.7.4;
- 1> if the received *otherConfig* includes the *referenceTimePreferenceReporting*:

- 2> consider itself to be configured to provide UE reference time assistance information in accordance with 5.7.4;
- 1> else:
 - 2> consider itself not to be configured to provide UE reference time assistance information;
- 1> if the received *otherConfig* includes the *successHO-Config*:
 - 2> consider itself to be configured to provide the successful handover information in accordance with 5.7.10.6;
- 1> else:
 - 2> consider itself not to be configured to provide the successful handover information.
- 1> if the received *otherConfig* includes the *ul-GapFR2-PreferenceConfig*:
 - 2> consider itself to be configured to provide its preference on FR2 UL gap in accordance with 5.7.4;
- 1> else:
 - 2> consider itself not to be configured to provide its preference on FR2 UL gap;
- 1> if the received *otherConfig* includes the *musim-GapAssistanceConfig*:
 - 2> if *musim-GapAssistanceConfig* is set to *setup*:
 - 3> consider itself to be configured to provide MUSIM assistance information for gap preference in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to provide MUSIM assistance information for gap preference and stop timer T346h, if running;
- 1> if the received other Config includes the musim-Leave Assistance Config:
 - 2> if *musim-LeaveAssistanceConfig* is set to *setup*:
 - 3> consider itself to be configured to provide MUSIM assistance information for leaving RRC CONNECTED in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to provide MUSIM assistance information for leaving RRC_CONNECTED and stop timer T346g, if running.
- 1> if the received *otherConfig* includes the *rlm-RelaxationReportingConfig*:
 - 2> if rlm-RelaxationReportingConfig is set to setup:
 - 3> consider itself to be configured to report the relaxation state of RLM measurements in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to report the relaxation state of RLM measurements and stop timer T346j associated with the cell group, if running;
- 1> if the received other Config includes the bfd-Relaxation Reporting Config:
 - 2> if *bfd-RelaxationReportingConfig* is set to *setup*:
 - 3> consider itself to be configured to report the relaxation state of BFD measurements in accordance with 5.7.4;
 - 2> else:

- 3> consider itself not to be configured to report the relaxation state of BFD measurements and stop timer T346k associated with the cell group, if running;
- 1> if the received *otherConfig* includes the *scg-DeactivationPreferenceConfig*:
 - 2> if the scg-DeactivationPreferenceConfig is set to setup:
 - 3> consider itself to be configured to provide its SCG deactivation preference in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to provide its SCG deactivation preference and stop timer T346i, if running.
- 1> if the received *otherConfig* includes the *propDelayDiffReportConfig*:
 - 2> if the *propDelayDiffReportConfig* is set to *setup*:
 - 3> consider itself to be configured to provide service link propagation delay difference between serving cell and neighbour cell(s) in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to provide service link propagation delay difference between serving cell and neighbour cell(s).
- 1> if the received *otherConfig* includes the *rrm-MeasRelaxationReportingConfig*:
 - 2> if the *rrm-MeasRelaxationReportingConfig* is set to *setup*:
 - 3> consider itself to be configured to report the fulfilment of the criterion for relaxing RRM measurements in accordance with 5.7.4:
 - 2> else:
 - 3> consider itself not to be configured to report the fulfilment of the criterion for relaxing RRM measurements.

5.3.5.9a MUSIM gap configuration

- 1> if musim-GapConfig is set to setup:
 - 2> for each *musim-GapId* included in the received *musim-GapToReleaseList*:
 - 3> release the periodic MUSIM gap configuration associated with the musim-GapId;
 - 2> for each MUSIM-Gap included in the received musim-GapToAddModList:
 - 3> setup periodic MUSIM gap configuration indicated by the *MUSIM-Gap* in accordance with the received *musim-GapRepetitionAndOffset* (providing *musim-GapRepetition* and *Offset* value for the following condition) i.e. the first subframe of each periodic MUSIM gap occurs at an SFN and subframe of the NR PCell meeting the following condition:

```
SFN mod T = \text{FLOOR}(Offset/10);
subframe = Offset \mod 10;
with T = musim\text{-}GapRepetition/10;
```

- 2> if musim-AperiodicGap is included:
 - 3> setup aperiodic MUSIM gap configuration indicated by the *musim-AperiodicGap* in accordance with the received *musim-Starting-SFN-AndSubframe*, i.e. the first subframe of aperiodic MUSIM gap occurs at an SFN and subframe of the NR PCell meeting the following condition:

SFN = starting - SFN;

subframe = startingSubframe;

- 1> else if *musim-GapConfig* is set to *release*:
 - 2> release the MUSIM gap configuration.

5.3.5.10 MR-DC release

The UE shall:

- 1> as a result of MR-DC release triggered by E-UTRA or NR:
 - 2> release SRB3, if established, as specified in 5.3.5.6.2;
 - 2> release *measConfig* associated with SCG;
 - 2> if the UE is configured with NR SCG:
 - 3> release the SCG configuration as specified in clause 5.3.5.4;
 - 3> release *otherConfig* associated with the SCG, if configured;
 - 3> stop timers T346a, T346b, T346c, T346d, T346e, T346j and T346k associated with the SCG, if running;
 - 3> release bap-Config associated with the SCG, if configured;
 - 3> release the BAP entity as specified in TS 38.340 [47], if there is no configured bap-Config;
 - 3> release iab-IP-AddressConfigurationList associated with the SCG, if configured;
 - 2> else if the UE is configured with E-UTRA SCG:
 - 3> release the SCG configuration as specified in TS 36.331 [10], clause 5.3.10.19 to release the E-UTRA SCG:

5.3.5.11 Full configuration

The UE shall:

1> release/ clear all current dedicated radio configurations except for the following:

- the MCG C-RNTI;
- the AS security configurations associated with the master key;
- the SRB1/SRB2 configurations and DRB/multicast MRB configurations as configured by *radioBearerConfig* or *radioBearerConfig2*.
- NOTE 1: Radio configuration is not just the resource configuration but includes other configurations like *MeasConfig.* Radio configuration also includes the RLC bearer configurations as configured by *RLC-BearerConfig,* PC5 Relay RLC channel as configured by *SL-RLC-ChannelConfig,* and Uu Relay RLC channel as configured by *Uu-RelayRLC-ChannelConfig.* In case NR-DC or NE-DC is configured, this also includes the entire NR or E-UTRA SCG configuration which are released according to the MR-DC release procedure as specified in 5.3.5.10.
- NOTE 1a: For NR sidelink communication/discovery, the radio configuration includes the sidelink RRC configuration received from the network, but does not include the sidelink RRC reconfiguration and sidelink UE capability received from other UEs via PC5-RRC. In addition, the UE considers the new NR sidelink configurations as full configuration, in case of state transition and change of system information used for NR sidelink communication/discovery.
- NOTE 1b:To establish the RLC bearer of SRB(s) after release due to *fullConfig*, the network can include the *srb-Identity* within *srb-ToAddModList* (i.e. the UE applies RLC default configuration) and/or provide *rlc-BearerToAddModList* of concerned SRB(s) explicitly.

- the logged measurement configuration;
- 1> if the *spCellConfig* in the *masterCellGroup* includes the *reconfigurationWithSync*:
 - 2> release/ clear all current common radio configurations;
 - 2> if sl-PathSwitchConfig was included in reconfigurationWithSync:
 - 3> use the default values specified in 9.2.3 for timer T311;
 - 2> else:
 - 3> use the default values specified in 9.2.3 for timers T310, T311 and constants N310, N311;
- 1> else (full configuration after re-establishment or during RRC resume):
 - 2> if the UE is acting as L2 U2N Remote UE:
 - 3> use value for timer T311, as included in ue-TimersAndConstants received in SIB1
 - 2> else:
 - 3> use values for timers T301, T310, T311 and constants N310, N311, as included in *ue-TimersAndConstants* received in *SIB1*;
- 1> if no measConfigAppLayerId is included:
 - 2> inform upper layers about the release of all application layer measurement configurations;
 - 2> discard any received application layer measurement report from upper layers;
 - 2> consider itself not to be configured to send application layer measurement report.
- 1> if the UE is acting as L2 U2N Remote UE at the target side during reconfiguration with sync, or after reestablishment, or during RRC resume:
 - 2> apply the default configuration of SL-RLC1 as specified in clause 9.2.4 and associate it with the SRB1;
- 1> else:
 - 2> apply the default L1 parameter values as specified in corresponding physical layer specifications except for the following:
 - parameters for which values are provided in SIB1;
 - 2> apply the default MAC Cell Group configuration as specified in 9.2.2;
 - 2> for each srb-Identity value included in the srb-ToAddModList (SRB reconfiguration):
 - 3> establish an RLC entity for the corresponding SRB;
 - 3> apply the default SRB configuration defined in 9.2.1 for the corresponding SRB;
- NOTE 2: This is to get the SRBs (SRB1 and SRB2 for reconfiguration with sync and SRB2 for resume and reconfiguration after re-establishment) to a known state from which the reconfiguration message can do further configuration.
- 1> for each *pdu-Session* that is part of the current UE configuration:
 - 2> release the SDAP entity (clause 5.1.2 in TS 37.324 [24]);
 - 2> release each DRB associated to the *pdu-Session* as specified in 5.3.5.6.4;
- NOTE 3: This will retain the *pdu-Session* but remove the DRBs including *drb-identity* of these bearers from the current UE configuration. Setup of the DRBs within the AS is described in clause 5.3.5.6.5 using the new configuration. The *pdu-Session* acts as the anchor for associating the released and re-setup DRB. In the AS the DRB re-setup is equivalent with a new DRB setup (including new PDCP and logical channel configurations).

- 1> for each mbs-SessionId that is part of the current UE configuration and associated to a multicast MRB:
 - 2> release the SDAP entity (clause 5.1.2 in TS 37.324 [24]);
 - 2> release each multicast MRB associated to the mbs-SessionId as specified in 5.3.5.6.6;
- NOTE 4: This will retain the *mbs-SessionId* but remove the multicast MRBs including *mrb-identity* of these bearers from the current UE configuration. Setup of the multicast MRBs within the AS is described in clause 5.3.5.6.7 using the new configuration. The *mbs-SessionId* acts as the anchor for associating the released and re-setup multicast MRB. In the AS the multicast MRB re-setup is equivalent with a new multicast MRB setup (including new PDCP and logical channel configurations).
- 1> for each *pdu-Session* that is part of the current UE configuration but not added with same *pdu-Session* in the *drb-ToAddModList*:
 - 2> if the procedure was triggered due to reconfiguration with sync:
 - 3> indicate the release of the user plane resources for the *pdu-Session* to upper layers after successful reconfiguration with sync;
 - 2> else:
 - 3> indicate the release of the user plane resources for the *pdu-Session* to upper layers immediately;
- 1> for each *mbs-SessionId* that is part of the current UE configuration but not added with the same *mbs-SessionId* in the *mrb-ToAddModList*:
 - 2> if the procedure was triggered due to reconfiguration with sync:
 - 3> indicate the release of the user plane resources for the *mbs-SessionId* to upper layers after successful reconfiguration with sync;
 - 2> else:
 - 3> indicate the release of the user plane resources for the *mbs-SessionId* to upper layers immediately.

5.3.5.12 BAP configuration

The IAB-MT shall:

- 1> if the *bap-Config* is set to *setup*:
 - 2> if no BAP entity is established:
 - 3> establish a BAP entity as specified in TS 38.340 [47];
 - 2> if bap-address is included:
 - 3> configure the BAP entity to use the bap-Address as this node's BAP address;
 - 2> if *defaultUL-BAP-RoutingID* is included:
 - 3> configure the BAP entity to apply the default UL BAP routing ID according to the configuration;
 - 2> if defaultUL-BH-RLC-Channel is included
 - 3> configure the BAP entity to apply the default UL BH RLC channel according to the configuration;
 - 2> if *flowControlFeedbackType* is included:
 - 3> configure the BAP entity to apply the flow control feedback according to the configuration;
- 1> if the *bap-Config* is set to *release*:
 - 2> release the concerned *bap-Config*;
 - 2> if there is no other configured bap-Config for the MCG or for the SCG

3> release the BAP entity as specified in TS 38.340 [47].

5.3.5.12a IAB Other Configuration

5.3.5.12a.1 IP address management

5.3.5.12a.1.1 IP Address Release

The IAB-MT shall:

- 1> if the release is triggered by reception of the *iab-IP-AddressToReleaseList*:
 - 2> for each iab-IP-AddressIndex value included in iab-IP-AddressToReleaseList:
 - 3> release the corresponding *IAB-IP-AddressConfiguration*.

5.3.5.12a.1.2 IP Address Addition/Modification

The IAB-MT shall:

- 1> for each *iab-IP-AddressIndex* value included in the *iab-IP-AddressToAddModList* that is not part of the current IAB-MT configuration:
 - 2> add the IP address indicated in *iab-IP-Address*, corresponding to the *iab-IP-AddressIndex*.
 - 2> if added IP address is *iPv4-Address*:
 - 3> if *iab-IP-Usage* is set to *f1-C*:
 - 4> store the received IPv4 address for F1-C traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.
 - 3> else if *iab-IP-Usage* is set to *f1-U*:
 - 4> store the received IPv4 address for F1-U traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.
 - 3> else if *iab-IP-Usage* is set to *non-F1*:
 - 4> store the received IPv4 address for non-F1 traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.
 - 3> else:
 - 4> store the received IPv4 address for all traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.
 - 2> else if *iPv6-Address* is included:
 - 3> if *iab-IP-Usage* is set to *f1-C*:
 - 4> store the received IPv6 address for F1-C traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.
 - 3> else if *iab-IP-Usage* is set to *f1-U*:
 - 4> store the received IPv6 address for F1-U traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.
 - 3> else if *iab-IP-Usage* is set to *non-F1*:
 - 4> store the received IPv6 address for non-F1 traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.
 - 3> else:

- 4> store the received IPv6 address for all traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.
- 2> else if *iPv6-Prefix* is included in *iab-IP-AddressToAddModList*:
 - 3> if *iab-IP-Usage* is set to *f1-C*:
 - 4> store the received IPv6 address prefix for F1-C traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.
 - 3> else if *iab-IP-Usage* is set to *f1-U*:
 - 4> store the received IPv6 address prefix for F1-U traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.
 - 3> else if *iab-IP-Usage* is set to *non-F1*:
 - 4> store the received IPv6 address prefix for non-F1 traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.
 - 3> else:
 - 4> store the received IPv6 address prefix for all traffic together with the IAB-donor-DU BAP address corresponding to the *iab-IP-AddressIndex*.
- 1> for each *iab-IP-AddressIndex* value included in the *iab-IP-AddressToAddModList* that is part of the current IAB-MT configuration:
 - 2> modify the IP address configuration(s) in accordance with the IAB-IP-AddressConfiguration corresponding to the iab-IP-AddressIndex.

5.3.5.13 Conditional Reconfiguration

5.3.5.13.1 General

The network configures the UE with one or more candidate target SpCells in the conditional reconfiguration. The UE evaluates the condition of each configured candidate target SpCell. The UE applies the conditional reconfiguration associated with one of the target SpCells which fulfils associated execution condition. The network provides the configuration parameters for the target SpCell in the *ConditionalReconfiguration* IE.

In NR-DC, the UE may receive two independent *conditionalReconfiguration*:

- a conditionalReconfiguration associated with MCG, that is included in the *RRCReconfiguration* message received via SRB1; and
- a *conditionalReconfiguration*, associated with SCG, that is included in the *RRCReconfiguration* message received via SRB3, or, alternatively, included within a *RRCReconfiguration* message embedded in a *RRCReconfiguration* message received via SRB1.

In this case:

- the UE maintains two independent *VarConditionalReconfig*, one associated with each *conditionalReconfiguration*;
- the UE independently performs all the procedures in clause 5.3.5.13 for each *conditionalReconfiguration* and the associated *VarConditionalReconfig*, unless explicitly stated otherwise;
- the UE performs the procedures in clause 5.5 for the *VarConditionalReconfig* associated with the same cell group like the *measConfig*.

In EN-DC, the VarConditionalReconfig is associated with the SCG.

In NE-DC and when no SCG is configured, the VarConditionalReconfig is associated with the MCG.

The UE performs the following actions based on a received ConditionalReconfiguration IE:

- 1> if the ConditionalReconfiguration contains the condReconfigToRemoveList:
 - 2> perform conditional reconfiguration removal procedure as specified in 5.3.5.13.2;
- $1> if the {\it Conditional Reconfiguration} contains the {\it cond Reconfig To Add Mod List}:$
 - 2> perform conditional reconfiguration addition/modification as specified in 5.3.5.13.3;

5.3.5.13.2 Conditional reconfiguration removal

The UE shall:

- 1> for each *condReconfigId* value included in the *condReconfigToRemoveList* that is part of the current UE conditional reconfiguration in *VarConditionalReconfig*:
 - 2> remove the entry with the matching *condReconfigId* from the *VarConditionalReconfig*;

NOTE: The UE does not consider the message as erroneous if the *condReconfigToRemoveList* includes any cond*ReconfigId* value that is not part of the current UE configuration.

5.3.5.13.3 Conditional reconfiguration addition/modification

For each condReconfigId received in the condReconfigToAddModList IE the UE shall:

- 1> if an entry with the matching *condReconfigId* exists in the *condReconfigToAddModList* within the *VarConditionalReconfig*:
 - 2> if the entry in condReconfigToAddModList includes an condExecutionCond or condExecutionCondSCG;
 - 3> replace *condExecutionCond* or *condExecutionCondSCG* within the *VarConditionalReconfig* with the value received for this *condReconfigId*;
 - 2> if the entry in condReconfigToAddModList includes an condRRCReconfig;
 - 3> replace *condRRCReconfig* within the *VarConditionalReconfig* with the value received for this *condReconfigId*;

1> else:

- 2> add a new entry for this condReconfigId within the VarConditionalReconfig;
- 1> perform conditional reconfiguration evaluation as specified in 5.3.5.13.4;

5.3.5.13.4 Conditional reconfiguration evaluation

- 1> for each *condReconfigId* within the *VarConditionalReconfig*:
 - 2> if the *RRCReconfiguration* within *condRRCReconfig* includes the *masterCellGroup* including the *reconfigurationWithSync*:
 - 3> consider the cell which has a physical cell identity matching the value indicated in the ServingCellConfigCommon included in the reconfigurationWithSync within the masterCellGroup in the received condRRCReconfig to be applicable cell;
 - 2> else if the *RRCReconfiguration* within *condRRCReconfig* includes the *secondaryCellGroup* including the *reconfigurationWithSync*:
 - 3> consider the cell which has a physical cell identity matching the value indicated in the ServingCellConfigCommon included in the reconfigurationWithSync within the secondaryCellGroup within the received condRRCReconfig to be applicable cell;
 - 2> if *condExecutionCondSCG* is configured:

- 3> in the remainder of the procedure, consider each *measId* indicated in the *condExecutionCondSCG* as a *measId* in the *VarMeasConfig* associated with the SCG *measConfig*;
- 2> if *condExecutionCond* is configured:
 - 3> if it is configured via SRB3 or configured within *nr-SCG* or within *nr-SecondaryCellGroupConfig* (specified in TS 36.331[10]) via SRB1:
 - 4> in the remainder of the procedure, consider each *measId* indicated in the *condExecutionCond* as a *measId* in the *VarMeasConfig* associated with the SCG *measConfig*;

3> else:

- 4> in the remainder of the procedure, consider each *measId* indicated in the *condExecutionCond* as a *measId* in the *VarMeasConfig* associated with the MCG *measConfig*;
- 2> for each *measId* included in the *measIdList* within *VarMeasConfig* indicated in the *condExecutionCond* or *condExecutionCondSCG* associated to *condReconfigId*:
 - 3> if the *condEventId* is associated with *condEventT1*, and if the entry condition applicable for this event associated with the *condReconfigId*, i.e. the event corresponding with the *condEventId(s)* of the corresponding *condTriggerConfig* within *VarConditionalReconfig*, is fulfilled for the applicable cell; or
 - 3> if the *condEventId* is associated with *condEventD1*, and if the entry conditions applicable for this event associated with the *condReconfigId*, i.e. the event corresponding with the *condEventId(s)* of the corresponding *condTriggerConfig* within *VarConditionalReconfig*, is fulfilled for the applicable cell during the corresponding *timeToTrigger* defined for this event within the *VarConditionalReconfig*; or
 - 3> if the *condEventId* is associated with *condEventA3*, *condEventA4* or *condEventA5*, and if the entry condition(s) applicable for this event associated with the *condReconfigId*, i.e. the event corresponding with the *condEventId(s)* of the corresponding *condTriggerConfig* within *VarConditionalReconfig*, is fulfilled for the applicable cells for all measurements after layer 3 filtering taken during the corresponding *timeToTrigger* defined for this event within the *VarConditionalReconfig*:
 - 4> consider the event associated to that *measId* to be fulfilled;
 - 3> if the measId for this event associated with the condReconfigId has been modified; or
 - 3> if the *condEventId* is associated with *condEventT1*, and if the leaving condition applicable for this event associated with the *condReconfigId*, i.e. the event corresponding with the *condEventId(s)* of the corresponding *condTriggerConfig* within *VarConditionalReconfig*, is fulfilled for the applicable cell; or
 - 3> if the *condEventId* is associated with *condEventD1*, and if the leaving condition(s) applicable for this event associated with the *condReconfigId*, i.e. the event corresponding with the *condEventId(s)* of the corresponding *condTriggerConfig* within *VarConditionalReconfig*, is fulfilled for the applicable cell during the corresponding *timeToTrigger* defined for this event within the *VarConditionalReconfig*; or
 - 3> if the *condEventId* is associated with *condEventA3*, *condEventA4* or *condEventA5*, and if the leaving condition(s) applicable for this event associated with the *condReconfigId*, i.e. the event corresponding with the *condEventId(s)* of the corresponding *condTriggerConfig* within *VarConditionalReconfig*, is fulfilled for the applicable cells for all measurements after layer 3 filtering taken during the corresponding *timeToTrigger* defined for this event within the *VarConditionalReconfig*:
 - 4> consider the event associated to that *measId* to be not fulfilled;
- 2> if event(s) associated to all *measId*(s) within *condTriggerConfig* for a target candidate cell within the stored *condRRCReconfig* are fulfilled:
 - 3> consider the target candidate cell within the stored *condRRCReconfig*, associated to that *condReconfigId*, as a triggered cell;
 - 3> initiate the conditional reconfiguration execution, as specified in 5.3.5.13.5;
- NOTE 1: Up to 2 *MeasId* can be configured for each *condReconfigId*. The conditional reconfiguration event of the 2 *MeasId* may have the same or different event conditions, triggering quantity, time to trigger, and triggering threshold.

NOTE 2: Void.

5.3.5.13.4a Conditional reconfiguration evaluation of SN initiated inter-SN CPC for EN-DC

The UE shall:

- 1> for each condReconfigurationId within the VarConditionalReconfiguration specified in TS 36.331[10]:
 - 2> for each *measId* included in the *measIdList* within *VarMeasConfig* indicated in the *CondReconfigExecCondSCG* contained in the *triggerConditionSN* associated to the *condReconfigurationId* as specified in TS 36.331[10]:
 - 3> if the entry condition(s) applicable for the event associated with that *measId*, is fulfilled for the applicable cells for all measurements after layer 3 filtering taken during the corresponding *timeToTrigger* defined for this event associated with that *measId*:
 - 4> consider this event to be fulfilled;
 - 3> if the *measId* for this event has been modified; or
 - 3> if the leaving condition(s) applicable for this event associated with that *measId*, is fulfilled for the applicable cells for all measurements after layer 3 filtering taken during the corresponding *timeToTrigger* defined for this event associated with that *measId*:
 - 4> consider this event associated to that *measId* to be not fulfilled;
 - 2> if trigger conditions for all events associated with the *measId(s)* indicated in the *CondReconfigExecCondSCG* contained in the *triggerConditionSN* as specified in TS 36.331[10]), are fulfilled:
 - 3> consider the target cell candidate within the *RRCReconfiguration* message contained in *nr-SecondaryCellGroupConfig* in the *RRCConnectionReconfiguration* message, as specified in TS 36.331[10], contained in the stored *condReconfigurationToApply*, associated to that *condReconfigurationId* as specified in TS 36.331[10]), clause 5.3.5.9.4, as a triggered cell;
 - 3> initiate the conditional reconfiguration execution, as specified in TS 36.331[10]), clause 5.3.5.9.5;

NOTE: Void.

5.3.5.13.5 Conditional reconfiguration execution

The UE shall:

- 1> if more than one triggered cell exists:
 - 2> select one of the triggered cells as the selected cell for conditional reconfiguration execution;
- 1> else:
 - 2> consider the triggered cell as the selected cell for conditional reconfiguration execution;
- 1> for the selected cell of conditional reconfiguration execution:
 - 2> apply the stored *condRRCReconfig* of the selected cell and perform the actions as specified in 5.3.5.3;
- NOTE: If multiple NR cells are triggered in conditional reconfiguration execution, it is up to UE implementation which one to select, e.g. the UE considers beams and beam quality to select one of the triggered cells for execution.

5.3.5.13a SCG activation

Upon initiating the procedure, the UE shall:

1> if the UE is configured with an SCG after receiving the message for which this procedure is initiated:

- 2> if the UE was configured with a deactivated SCG before receiving the message for which this procedure is initiated:
 - 3> consider the SCG to be activated;
 - 3> resume performing radio link monitoring on the SCG, if previously stopped;
 - 3> indicate to lower layers to resume beam failure detection on the PSCell, if previously stopped;
 - 3> indicate to lower layers that the SCG is activated.

5.3.5.13b SCG deactivation

Upon initiating the procedure, the UE shall:

- 1> consider the SCG to be deactivated;
- 1> indicate to lower layers that the SCG is deactivated;
- 1> if *bfd-and-RLM* is configured to *true*:
 - 2> perform radio link monitoring on the SCG;
 - 2> indicate to lower layers to perform beam failure detection on the PSCell;
- 1> else:
 - 2> stop radio link monitoring on the SCG;
 - 2> indicate to lower layers to stop beam failure detection on the PSCell;
 - 2> stop timer T310 for this cell group, if running;
 - 2> stop timer T312 for this cell group, if running;
 - 2> reset the counters N310 and N311;
- 1> if the UE was in RRC_CONNECTED and the SCG was activated before receiving the message for which this procedure is initiated:
 - 2> if SRB3 was configured before the reception of the *RRCReconfiguration* or of the *RRCConnectionReconfiguration* and SRB3 is not to be released according to any *RadioBearerConfig* included in the *RRCReconfiguration* or in the *RRCConnectionReconfiguration* as specified in TS 36.331[10]:
 - 3> trigger the PDCP entity of SRB3 to perform SDU discard as specified in TS 38.323 [5];
 - 3> re-establish the RLC entity of SRB3 as specified in TS 38.322 [4].

5.3.5.13b1 SCG activation without SN message

Upon initiating the procedure, the UE shall:

- 1> if the SCG was deactivated before the reception of the *RRCReconfiguration* message or the E-UTRA *RRCConnectionReconfiguration* message for which the procedure invoking this clause is executed:
 - 2> consider the SCG to be activated;
 - 2> indicate to lower layers that the SCG is activated;
 - 2> resume performing radio link monitoring on the SCG, if previously stopped;
 - 2> indicate to lower layers to resume beam failure detection on the PSCell, if previously stopped;
 - 2> if *bfd-and-RLM* was not configured to true before the reception of the *RRCReconfiguration* message or the E-UTRA *RRCConnectionReconfiguration* message for which the procedure invoking this clause is executed; or
 - 2> if lower layers indicate that a Random Access procedure is needed for SCG activation:

3> initiate the Random Access procedure on the PSCell, as specified in TS 38.321 [3].

5.3.5.13c FR2 UL gap configuration

The UE shall:

- 1> if *ul-GapFR2-Config* is set to setup:
 - 2> if an FR2 UL gap configuration is already setup, release the FR2 UL gap configuration;
 - 2> setup the FR2 UL gap configuration indicated by the *ul-GapFR2-Config* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition:

```
SFN mod T = FLOOR (gapOffset/10);
if the UGRP is larger than 5ms:
    subframe = gapOffset mod 10;
else:
    subframe = gapOffset or (gapOffset +5);
with T = CEIL(UGRP/10).
```

- 1> else if *ul-GapFR2-Config* is set to release:
 - 2> release the FR2 UL gap configuration.
- NOTE 1: For *ul-GapFR2-Config* configuration with synchronous CA, the SFN and subframe of a serving cell on FR2 frequency is used in the gap calculation. For *ul-GapFR2-Config* configuration with asynchronous CA, the SFN and subframe of a serving cell on FR2 frequency indicated by the *refFR2-ServCellAsyncCA* in *ul-GapFR2-Config* is used in the gap calculation.

5.3.5.13d Application layer measurement configuration

- 1> if measConfigAppLayerToReleaseList is included in appLayerMeasConfig within RRCReconfiguration or RRCResume:
 - 2> for each measConfigAppLayerId value included in the measConfigAppLayerToReleaseList:
 - 3> forward the *measConfigAppLayerId* and inform upper layers about the release of the application layer measurement configuration including any RAN visible application layer measurement configuration;
 - 3> discard any application layer measurement report received from upper layers;
 - 3> consider itself not to be configured to send application layer measurement report for the *measConfigAppLayerId*.
- 1> if measConfigAppLayerToAddModList is included in appLayerMeasConfig within RRCReconfiguration or RRCResume:
 - 2> for each measConfigAppLayerId value included in the measConfigAppLayerToAddModList:
 - 3> if measConfigAppLayerContainer is included for the corresponding MeasConfigAppLayer configuration:
 - 4> forward the *measConfigAppLayerContainer*, the *measConfigAppLayerId* and the *serviceType* to upper layers considering the *serviceType*;
 - 3> consider itself to be configured to send application layer measurement report for the *measConfigAppLayerId* in accordance with 5.7.16;

- 3> forward the *transmissionOfSessionStartStop*, if configured, and *measConfigAppLayerId* to upper layers considering the *serviceType*;
- 3> if ran-VisibleParameters is set to setup and the parameters have been received:
 - 4> forward the *measConfigAppLayerId*, the *ran-VisiblePeriodicity*, if configured, the *numberOfBufferLevelEntries*, if configured, and the *reportPlayoutDelayForMediaStartup*, if configured, to upper layers considering the *serviceType*;
- 3> else if ran-VisibleParameters is set to release:
 - 4> forward the *measConfigAppLayerId* and inform upper layers about the release of the RAN visible application layer measurement configuration;
- 3> if pauseReporting is set to true:
 - 4> if at least one segment, but not all segments, of a segmented *MeasurementReportAppLayer* message containing an application layer measurement report associated with the *measConfigAppLayerId* has been submitted to lower layers for transmission:
 - 5> submit the remaining segments of the *MeasurementReportAppLayer* message to lower layers for transmission;
 - 4> suspend submitting application layer measurement report containers to lower layers for the application layer measurement configuration associated with the *measConfigAppLayerId*;
 - 4> store any previously or subsequently received application layer measurement report containers associated with the *measConfigAppLayerId* for which no segment, or full message, has been submitted to lower layers for transmission;
- 3> else if *pauseReporting* is set to *false* and if transmission of application layer measurement report containers has previously been suspended for the application layer measurement configuration associated with the *measConfigAppLayerId*:
 - 4> submit stored application layer measurement report containers to lower layers, if any, for the application layer measurements configuration associated with the *measConfigAppLayerId*;
 - 4> resume submitting application layer measurement report containers to lower layers for the application layer measurement configuration associated with the *measConfigAppLayerId*;
- NOTE 1: The UE may discard reports when the memory reserved for storing application layer measurement reports becomes full.
- NOTE 2: The transmission of RAN visible application layer measurement reports and *appLayerSessionStatus* is not paused when *pauseReporting* is set to *true*.

5.3.5.14 Sidelink dedicated configuration

Upon initiating the procedure, the UE shall:

- 1> if sl-FreqInfoToReleaseList is included in sl-ConfigDedicatedNR within RRCReconfiguration:
 - 2> for each entry included in the received sl-FreqInfoToReleaseList that is part of the current UE configuration:
 - 3> release the related configurations from the stored NR sidelink communication/discovery configurations;
- 1> if sl-FreqInfoToAddModList is included in sl-ConfigDedicatedNR within RRCReconfiguration:
 - 2> if configured to receive NR sidelink communication:
 - 3> use the resource pool(s) indicated by *sl-RxPool* for NR sidelink communication reception, as specified in 5.8.7;
 - 2> if configured to transmit NR sidelink communication:

- 3> use the resource pool(s) indicated by *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling* or *sl-TxPoolExceptional* for NR sidelink communication transmission, as specified in 5.8.8;
- 2> if configured to receive NR sidelink discovery:
 - 3> use the resource pool(s) indicated by *sl-DiscRxPool* or *sl-RxPool* for NR sidelink discovery reception, as specified in 5.8.13.2;
- 2> if configured to transmit NR sidelink discovery:
 - 3> use the resource pool(s) indicated by *sl-DiscTxPoolSelected*, *sl-DiscTxPoolScheduling*, *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling* or *sl-TxPoolExceptional* for NR sidelink discovery transmission, as specified in 5.8.13.3;
- 2> perform CBR measurement on the transmission resource pool(s) indicated by *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling*, *sl-DiscTxPoolSelected*, *sl-DiscTxPoolScheduling* or *sl-TxPoolExceptional* for NR sidelink communication/discovery transmission, as specified in 5.5.3;
- 2> use the synchronization configuration parameters for NR sidelink communication/discovery on frequencies included in *sl-FreqInfoToAddModList*, as specified in 5.8.5;
- 1> if *sl-RadioBearerToReleaseList* or *sl-RLC-BearerToReleaseList* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:
 - 2> perform sidelink DRB release as specified in 5.8.9.1a.1;
- 1> if *sl-RadioBearerToAddModList* or *sl-RLC-BearerToAddModList* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:
 - 2> perform sidelink DRB addition/modification as specified in 5.8.9.1a.2;
- 1> if *sl-ScheduledConfig* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:
 - 2> configure the MAC entity parameters, which are to be used for NR sidelink communication/discovery, in accordance with the received *sl-ScheduledConfig*;
- 1> if sl-UE-SelectedConfig is included in sl-ConfigDedicatedNR within RRCReconfiguration:
 - 2> configure the parameters, which are to be used for NR sidelink communication/discovery, in accordance with the received *sl-UE-SelectedConfig*;
- 1> if sl-MeasConfigInfoToReleaseList is included in sl-ConfigDedicatedNR within RRCReconfiguration:
 - 2> for each *SL-DestinationIndex* included in the received *sl-MeasConfigInfoToReleaseList* that is part of the current UE configuration:
 - 3> remove the entry with the matching *SL-DestinationIndex* from the stored NR sidelink measurement configuration information;
- 1> if sl-MeasConfigInfoToAddModList is included in sl-ConfigDedicatedNR within RRCReconfiguration:
 - 2> for each *sl-DestinationIndex* included in the received *sl-MeasConfigInfoToAddModList* that is part of the current stored NR sidelink measurement configuration:
 - 3> reconfigure the entry according to the value received for this *sl-DestinationIndex* from the stored NR sidelink measurement configuration information;
 - 2> for each *sl-DestinationIndex* included in the received *sl-MeasConfigInfoToAddModList* that is not part of the current stored NR sidelink measurement configuration:
 - 3> add a new entry for this *sl-DestinationIndex* to the stored NR sidelink measurement configuration.
- 1> if sl-DRX-ConfigUC-ToReleaseList is included in sl-ConfigDedicatedNR within RRCReconfiguration:
 - 2> for each *SL-DestinationIndex* included in the received *sl-DRX-ConfigUC-ToReleaseList* that is part of the current UE configuration:

- 3> remove the entry with the matching *SL-DestinationIndex* from the stored NR sidelink DRX configuration information;
- 1> if sl-DRX-ConfigUC-ToAddModList is included in sl-ConfigDedicatedNR within RRCReconfiguration:
 - 2> for each *sl-DestinationIndex* included in the received *sl-DRX-ConfigUC-ToAddModList* that is part of the current stored NR sidelink DRX configuration:
 - 3> reconfigure the entry according to the value received for this *sl-DestinationIndex* from the stored NR sidelink DRX configuration information;
 - 2> for each *sl-DestinationIndex* included in the received *sl-DRX-ConfigUC-ToAddModList* that is not part of the current stored NR sidelink DRX configuration:
 - 3> add a new entry for this sl-DestinationIndex to the stored NR sidelink DRX configuration.
- 1> if sl-RLC-ChannelToReleaseList is included in sl-ConfigDedicatedNR within RRCReconfiguration:
 - 2> perform PC5 Relay RLC channel release as specified in 5.8.9.7.1;
- 1> if sl-RLC-ChannelToAddModList is included in sl-ConfigDedicatedNR within RRCReconfiguration:
 - 2> perform PC5 Relay RLC channel addition/modification as specified in 5.8.9.7.2;

5.3.5.15 L2 U2N Relay UE configuration

5.3.5.15.1 General

The network configures the L2 U2N Relay UE with relay operation related configurations. For each connected L2 U2N Remote UE indicated in *sl-L2IdentityRemote*, the network provides the configuration parameters used for relaying.

The L2 U2N Relay UE shall:

- 1> if *sl-L2RelayUE-Config* is set to setup:
 - 2> if the sl-L2RelayUE-Config contains the sl-RemoteUE-ToReleaseList:
 - 3> perform the L2 U2N Remote UE release as specified in 5.3.5.15.2;
 - 2> if the sl-L2RelayUE-Config contains the sl-RemoteUE-ToAddModList:
 - 3> perform the L2 U2N Remote UE addition/modification as specified in 5.3.5.15.3;
- 1> else if *sl-L2RelayUE-Config* is set to *release*:
 - 2> release the relay operation related configurations.

5.3.5.15.2 L2 U2N Remote UE Release

The L2 U2N Relay UE shall:

- 1> if the release is triggered by reception of the *sl-RemoteUE-ToReleaseList*:
 - 2> for each SL-DestinationIdentity value included in the sl-RemoteUE-ToReleaseList:
 - 3> if the current UE has a PC5 RRC connection to a L2 U2N Remote UE with SL-DestinationIdentity:
 - 4> indicate upper layers to trigger PC5 unicast link release.

5.3.5.15.3 L2 U2N Remote UE Addition/Modification

The L2 U2N Relay UE shall:

- 1> if no SRAP entity has been established:
 - 2> establish a SRAP entity as specified in TS 38.351 [66];

- 1> for each *sl-L2IdentityRemote* value included in the *sl-RemoteUE-ToAddModList* that is not part of the current UE configuration (L2 U2N Remote UE Addition):
 - 2> configure the parameters to SRAP entity in accordance with the sl-SRAP-ConfigRelay;
 - 2> if SRB1 is included in sl-MappingToAddModList, and sl-EgressRLC-ChannelPC5 is configured:
 - 3> release SL-RLC1, if established;
 - 3> associate the PC5 Relay RLC channel as indicated by sl-EgressRLC-ChannelPC5 with SRB1;
 - 2> else: (i.e. SRB1 is not included in *sl-MappingToAddModList*, or SRB1 is included in *sl-MappingToAddModList*, but *sl-EgressRLC-ChannelPC5* is not configured)
 - 3> if SL-RLC1 is not established:
 - 4> apply the default configuration of SL-RLC1 as specified in clause 9.2.4 and associate it with the SRB1;
- 1> for each *sl-L2IdentityRemote* value included in the *sl-RemoteUE-ToAddModList* that is part of the current UE configuration (L2 U2N Remote UE modification):
 - 2> modify the configuration in accordance with the sl-SRAP-ConfigRelay;

5.3.5.16 L2 U2N Remote UE configuration

The network configures the L2 U2N Remote UE with relay operation related configurations, e.g. SRAP configuration.

The L2 U2N Remote UE shall:

- 1> if *sl-SRAP-ConfigRemote* is set to *setup*:
 - 2> if the *sl-L2RemoteUE-Config* contains the *sl-SRAP-ConfigRemote*:
 - 3> if no SRAP entity has been established:
 - 4> establish a SRAP entity as specified in TS 38.351 [66];
 - 3> configure the parameters to SRAP entity in accordance with the sl-SRAP-ConfigRemote;
 - 3> if SRB1 is included in sl-MappingToAddModList, and sl-EgressRLC-ChannelPC5 is configured:
 - 4> release SL-RLC1, if established;
 - 4> associate the PC5 Relay RLC channel as indicated by sl-EgressRLC-ChannelPC5 with SRB1;
 - 3> else: (i.e. SRB1 is not included in *sl-MappingToAddModList*, or SRB1 is included in *sl-MappingToAddModList*, but *sl-EgressRLC-ChannelPC5* is not configured)
 - 4> if SL-RLC1 is not established:
 - 5> apply the default configuration of SL-RLC1 as specified in clause 9.2.4 and associate it with the SRB1;
 - 2> if the *sl-L2RemoteUE-Config* contains the *sl-UEIdentityRemote*:
 - 3> use the value of the *sl-UEIdentityRemote* as the C-RNTI in the PCell.
- 1> else if *sl-SRAP-ConfigRemote* is set to *release*:
 - 2> release the relay operation related configurations.

5.3.6 Counter check

5.3.6.1 General

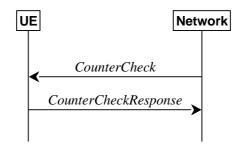


Figure 5.3.6.1-1: Counter check procedure

The counter check procedure is used by the network to request the UE to verify the amount of data sent/received on each DRB. More specifically, the UE is requested to check if, for each DRB, the most significant bits of the COUNT match with the values indicated by the network.

NOTE: The procedure enables the network to detect packet insertion by an intruder (a 'man in the middle').

5.3.6.2 Initiation

The network initiates the procedure by sending a *CounterCheck* message.

NOTE: The network may initiate the procedure when any of the COUNT values reaches a specific value.

5.3.6.3 Reception of the *CounterCheck* message by the UE

Upon receiving the *CounterCheck* message, the UE shall:

- 1> for each DRB that is established:
 - 2> if no COUNT exists for a given direction (uplink or downlink) because it is a uni-directional bearer configured only for the other direction:
 - 3> assume the COUNT value to be 0 for the unused direction;
 - 2> if the *drb-Identity* is not included in the *drb-CountMSB-InfoList*:
 - 3> include the DRB in the *drb-CountInfoList* in the *CounterCheckResponse* message by including the *drb-Identity*, the *count-Uplink* and the *count-Downlink* set to the value of TX_NEXT 1 and RX_NEXT 1 (specified in TS 38.323 [5]), respectively;
 - 2> else if, for at least one direction, the most significant bits of the COUNT are different from the value indicated in the *drb-CountMSB-InfoList*:
 - 3> include the DRB in the *drb-CountInfoList* in the *CounterCheckResponse* message by including the *drb-Identity*, the *count-Uplink* and the *count-Downlink* set to the value of TX_NEXT 1 and RX_NEXT 1 (specified in TS 38.323 [5]), respectively;
- 1> for each DRB that is included in the *drb-CountMSB-InfoList* in the *CounterCheck* message that is not established:
 - 2> include the DRB in the *drb-CountInfoList* in the *CounterCheckResponse* message by including the *drb-Identity*, the *count-Uplink* and the *count-Downlink* with the most significant bits set identical to the corresponding values in the *drb-CountMSB-InfoList* and the least significant bits set to zero;
- 1> submit the CounterCheckResponse message to lower layers for transmission upon which the procedure ends.

5.3.7 RRC connection re-establishment

5.3.7.1 General

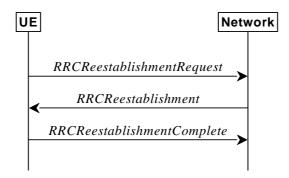


Figure 5.3.7.1-1: RRC connection re-establishment, successful

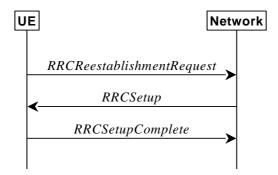


Figure 5.3.7.1-2: RRC re-establishment, fallback to RRC establishment, successful

The purpose of this procedure is to re-establish the RRC connection. A UE in RRC_CONNECTED, for which AS security has been activated with SRB2 and at least one DRB/multicast MRB setup or, for IAB, SRB2, may initiate the procedure in order to continue the RRC connection. The connection re-establishment succeeds if the network is able to find and verify a valid UE context or, if the UE context cannot be retrieved, and the network responds with an *RRCSetup* according to clause 5.3.3.4.

The network applies the procedure e.g as follows:

- When AS security has been activated and the network retrieves or verifies the UE context:
 - to re-activate AS security without changing algorithms;
 - to re-establish and resume the SRB1;
- When UE is re-establishing an RRC connection, and the network is not able to retrieve or verify the UE context:
 - to discard the stored AS Context and release all RBs and BH RLC channels and Uu Relay RLC channels;
 - to fallback to establish a new RRC connection.

If AS security has not been activated, the UE shall not initiate the procedure but instead moves to RRC_IDLE directly, with release cause 'other'. If AS security has been activated, but SRB2 and at least one DRB or multicast MRB or, for IAB, SRB2, are not setup, the UE does not initiate the procedure but instead moves to RRC_IDLE directly, with release cause 'RRC connection failure'.

5.3.7.2 Initiation

The UE initiates the procedure when one of the following conditions is met:

- 1> upon detecting radio link failure of the MCG and t316 is not configured, in accordance with 5.3.10; or
- 1> upon detecting radio link failure of the MCG while SCG transmission is suspended, in accordance with 5.3.10; or
- 1> upon detecting radio link failure of the MCG while PSCell change or PSCell addition is ongoing, in accordance with 5.3.10; or
- 1> upon detecting radio link failure of the MCG while the SCG is deactivated, in accordance with 5.3.10; or
- 1> upon re-configuration with sync failure of the MCG, in accordance with clause 5.3.5.8.3; or
- 1> upon mobility from NR failure, in accordance with clause 5.4.3.5; or
- 1> upon integrity check failure indication from lower layers concerning SRB1 or SRB2, except if the integrity check failure is detected on the *RRCReestablishment* message; or
- 1> upon an RRC connection reconfiguration failure, in accordance with clause 5.3.5.8.2; or
- 1> upon detecting radio link failure for the SCG while MCG transmission is suspended, in accordance with clause 5.3.10.3 in NR-DC or in accordance with TS 36.331 [10] clause 5.3.11.3 in NE-DC; or
- 1> upon reconfiguration with sync failure of the SCG while MCG transmission is suspended in accordance with clause 5.3.5.8.3; or
- 1> upon SCG change failure while MCG transmission is suspended in accordance with TS 36.331 [10] clause 5.3.5.7a; or
- 1> upon SCG configuration failure while MCG transmission is suspended in accordance with clause 5.3.5.8.2 in NR-DC or in accordance with TS 36.331 [10] clause 5.3.5.5 in NE-DC; or
- 1> upon integrity check failure indication from SCG lower layers concerning SRB3 while MCG is suspended; or
- 1> upon T316 expiry, in accordance with clause 5.7.3b.5; or
- 1> upon detecting sidelink radio link failure by L2 U2N Remote UE in RRC_CONNECTED, in accordance with clause 5.8.9.3; or
- 1> upon reception of *NotificationMessageSidelink* including *indicationType* by L2 U2N Remote UE in RRC CONNECTED, in accordance with clause 5.8.9.10; or
- 1> upon PC5 unicast link release indicated by upper layer at L2 U2N Remote UE in RRC_CONNECTED.
- NOTE 0: It is up to UE implementation whether to initiate the procedure while T346g is running.

Upon initiation of the procedure, the UE shall:

- 1> stop timer T310, if running;
- 1> stop timer T312, if running;
- 1> stop timer T304, if running;
- 1> start timer T311;
- 1> stop timer T316, if running;
- 1> if UE is not configured with attemptCondReconfig:
 - 2> reset MAC;
 - 2> release *spCellConfig*, if configured;
 - 2> suspend all RBs, and BH RLC channels for IAB-MT, and Uu Relay RLC channels for L2 U2N Relay UE, except SRB0 and broadcast MRBs;
 - 2> release the MCG SCell(s), if configured;

- 2> if MR-DC is configured:
 - 3> perform MR-DC release, as specified in clause 5.3.5.10;
- 2> release delayBudgetReportingConfig, if configured and stop timer T342, if running;
- 2> release overheatingAssistanceConfig, if configured and stop timer T345, if running;
- 2> release idc-AssistanceConfig, if configured;
- 2> release btNameList, if configured;
- 2> release wlanNameList, if configured;
- 2> release sensorNameList, if configured;
- 2> release *drx-PreferenceConfig* for the MCG, if configured and stop timer T346a associated with the MCG, if running;
- 2> release *maxBW-PreferenceConfig* for the MCG, if configured and stop timer T346b associated with the MCG, if running;
- 2> release *maxCC-PreferenceConfig* for the MCG, if configured and stop timer T346c associated with the MCG, if running;
- 2> release *maxMIMO-LayerPreferenceConfig* for the MCG, if configured and stop timer T346d associated with the MCG, if running;
- 2> release *minSchedulingOffsetPreferenceConfig* for the MCG, if configured stop timer T346e associated with the MCG, if running;
- 2> release *rlm-RelaxationReportingConfig* for the MCG, if configured and stop timer T346j associated with the MCG, if running;
- 2> release *bfd-RelaxationReportingConfig* for the MCG, if configured and stop timer T346k associated with the MCG, if running;
- 2> release *releasePreferenceConfig*, if configured stop timer T346f, if running;
- 2> release on Demand SIB-Request if configured, and stop timer T350, if running;
- 2> release referenceTimePreferenceReporting, if configured;
- 2> release *sl-AssistanceConfigNR*, if configured;
- 2> release *obtainCommonLocation*, if configured;
- 2> release musim-GapAssistanceConfig, if configured and stop timer T346h, if running;
- 2> release *musim-LeaveAssistanceConfig*, if configured;
- 2> release *ul-GapFR2-PreferenceConfig*, if configured;
- 2> release scg-DeactivationPreferenceConfig, if configured, and stop timer T346i, if running;
- 2> release *propDelayDiffReportConfig*, if configured;
- 2> release *rrm-MeasRelaxationReportingConfig*, if configured;
- 2> release maxBW-PreferenceConfigFR2-2, if configured;
- 2> release *maxMIMO-LayerPreferenceConfigFR2-2*, if configured;
- $2 \gt{release} \textit{ minSchedulingOffsetPreferenceConfigExt}, if configured; \\$
- 1> release *successHO-Config*, if configured;
- 1> if any DAPS bearer is configured:

- 2> reset the source MAC and release the source MAC configuration;
- 2> for each DAPS bearer:
 - 3> release the RLC entity or entities as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the source SpCell;
 - 3> reconfigure the PDCP entity to release DAPS as specified in TS 38.323 [5];
- 2> for each SRB:
 - 3> release the PDCP entity for the source SpCell;
 - 3> release the RLC entity as specified in TS 38.322 [4], clause 5.1.3, and the associated logical channel for the source SpCell;
- 2> release the physical channel configuration for the source SpCell;
- 2> discard the keys used in the source SpCell (the K_{gNB} key, the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key), if any;
- 1> release *sl-L2RelayUE-Config*, if configured;
- 1> release *sl-L2RemoteUE-Config*, if configured;
- 1> release the SRAP entity, if configured;
- 1> if the UE is acting as L2 U2N Remote UE:
 - 2> if the PC5-RRC connection with the U2N Relay UE is determined to be released:
 - 3> indicate upper layers to trigger PC5 unicast link release;
 - 3> perform either cell selection in accordance with the cell selection process as specified in TS 38.304 [20], or relay selection as specified in clause 5.8.15.3, or both;
 - 2> else (i.e., maintain the PC5 RRC connection):
 - 3> consider the connected L2 U2N Relay UE as suitable and perform actions as specified in clause 5.3.7.3a;
- NOTE 1: It is up to Remote UE implementation whether to release or keep the current PC5 unicast link.

1> else:

- 2> if the UE is capable of L2 U2N Remote UE:
 - 3> perform either cell selection as specified in TS 38.304 [20], or relay selection as specified in clause 5.8.15.3, or both;
- 2> else:
 - 3> perform cell selection in accordance with the cell selection process as specified in TS 38.304 [20].
- NOTE 2: For L2 U2N Remote UE, if both a suitable cell and a suitable relay are available, the UE can select either one based on its implementation.

5.3.7.3 Actions following cell selection while T311 is running

Upon selecting a suitable NR cell, the UE shall:

- 1> ensure having valid and up to date essential system information as specified in clause 5.2.2.2;
- 1> stop timer T311;
- 1> if T390 is running:
 - 2> stop timer T390 for all access categories;

- 2> perform the actions as specified in 5.3.14.4;
- 1> stop the relay (re)selection procedure, if ongoing;
- 1> if the cell selection is triggered by detecting radio link failure of the MCG or re-configuration with sync failure of the MCG or mobility from NR failure, and
- 1> if attemptCondReconfig is configured; and
- 1> if the selected cell is not configured with *CondEventT1*, or the selected cell is configured with *CondEventT1* and leaving condition has not been fulfilled; and
- 1> if the selected cell is one of the candidate cells for which the *reconfigurationWithSync* is included in the *masterCellGroup* in the MCG *VarConditionalReconfig*:
 - 2> if the UE supports RLF-Report for conditional handover, set the *choCellId* in the *VarRLF-Report* to the global cell identity, if available, otherwise to the physical cell identity and carrier frequency of the selected cell:
 - 2> apply the stored condRRCReconfig associated to the selected cell and perform actions as specified in 5.3.5.3;
- NOTE 1: It is left to network implementation to how to avoid keystream reuse in case of CHO based recovery after a failed handover without key change.

1> else:

- 2> if UE is configured with attemptCondReconfig:
 - 3> reset MAC:
 - 3> release spCellConfig, if configured;
 - 3> release the MCG SCell(s), if configured;
 - 3> release delayBudgetReportingConfig, if configured and stop timer T342, if running;
 - 3> release overheatingAssistanceConfig, if configured and stop timer T345, if running;
 - 3> if MR-DC is configured:
 - 4> perform MR-DC release, as specified in clause 5.3.5.10;
 - 3> release idc-AssistanceConfig, if configured;
 - 3> release btNameList, if configured;
 - 3> release wlanNameList, if configured;
 - 3> release sensorNameList, if configured;
 - 3> release *drx-PreferenceConfig* for the MCG, if configured and stop timer T346a associated with the MCG, if running;
 - 3> release *maxBW-PreferenceConfig* for the MCG, if configured and stop timer T346b associated with the MCG, if running;
 - 3> release *maxCC-PreferenceConfig* for the MCG, if configured and stop timer T346c associated with the MCG, if running;
 - 3> release *maxMIMO-LayerPreferenceConfig* for the MCG, if configured and stop timer T346d associated with the MCG, if running;
 - 3> release *minSchedulingOffsetPreferenceConfig* for the MCG, if configured and stop timer T346e associated with the MCG, if running;
 - 3> release *rlm-RelaxationReportingConfig* for the MCG, if configured and stop timer T346j associated with the MCG, if running;

- 3> release *bfd-RelaxationReportingConfig* for the MCG, if configured and stop timer T346k associated with the MCG, if running;
- 3> release releasePreferenceConfig, if configured and stop timer T346f, if running;
- 3> release on Demand SIB-Request if configured, and stop timer T350, if running;
- 3> release referenceTimePreferenceReporting, if configured;
- 3> release sl-AssistanceConfigNR, if configured;
- 3> release *obtainCommonLocation*, if configured;
- 3> release scg-DeactivationPreferenceConfig, if configured, and stop timer T346i, if running;
- 3> release musim-GapAssistanceConfig, if configured and stop timer T346h, if running;
- 3> release *musim-LeaveAssistanceConfig*, if configured;
- 3> release *propDelayDiffReportConfig*, if configured;
- 3> release *ul-GapFR2-PreferenceConfig*, if configured;
- 3> release rrm-MeasRelaxationReportingConfig, if configured;
- 3> release maxBW-PreferenceConfigFR2-2, if configured;
- 3> release maxMIMO-LayerPreferenceConfigFR2-2, if configured;
- 3> release *minSchedulingOffsetPreferenceConfigExt*, if configured;
- 3> suspend all RBs, and BH RLC channels for the IAB-MT, except SRB0 and broadcast MRBs;
- 2> remove all the entries within the MCG VarConditionalReconfig, if any;
- 2> for each measId, if the associated reportConfig has a reportType set to condTriggerConfig:
 - 3> for the associated *reportConfigId*:
 - 4> remove the entry with the matching *reportConfigId* from the *reportConfigList* within the *VarMeasConfig*;
 - 3> if the associated *measObjectId* is only associated to a *reportConfig* with *reportType* set to *condTriggerConfig*:
 - 4> remove the entry with the matching *measObjectId* from the *measObjectList* within the *VarMeasConfig*;
 - 3> remove the entry with the matching measId from the measIdList within the VarMeasConfig;
- 2> release the PC5 RLC entity for SL-RLC0, if any;
- 2> start timer T301;
- 2> apply the default L1 parameter values as specified in corresponding physical layer specifications except for the parameters for which values are provided in *SIB1*;
- 2> apply the default MAC Cell Group configuration as specified in 9.2.2;
- 2> apply the CCCH configuration as specified in 9.1.1.2;
- $2 \!\!> apply \ the \ \textit{timeAlignmentTimerCommon} \ included \ in \ SIB1;$
- 2> initiate transmission of the RRCReestablishmentRequest message in accordance with 5.3.7.4;
- NOTE 2: This procedure applies also if the UE returns to the source PCell.

Upon selecting an inter-RAT cell, the UE shall:

1> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'RRC connection failure'.

5.3.7.3a Actions following relay selection while T311 is running

Upon selecting a suitable L2 U2N Relay UE, the L2 U2N Remote UE shall:

- 1> indicate to upper layer to trigger the PC5 unicast link establishment with the selected L2 U2N Relay UE, if a new L2 U2N Relay UE is selected;
- 1> ensure having valid and up to date essential system information as specified in clause 5.2.2.2;
- 1> stop timer T311;
- 1> if T390 is running:
 - 2> stop timer T390 for all access categories;
 - 2> perform the actions as specified in 5.3.14.4;
- 1> stop the cell selection procedure, if ongoing;
- 1> start timer T301;
- 1> release the RLC entity for SRB0, if any;
- 1> establish a SRAP entity as specified in TS 38.351 [66], if no SRAP entity has been established;
- 1> apply the specified configuration of SL-RLC0 as specified in 9.1.1.4;
- 1> apply the SDAP configuration and PDCP configuration as specified in 9.1.1.2 for SRB0;
- 1> initiate transmission of the RRCReestablishmentRequest message in accordance with 5.3.7.4.

5.3.7.4 Actions related to transmission of RRCReestablishmentRequest message

The UE shall set the contents of RRCReestablishmentRequest message as follows:

- 1> if the procedure was initiated due to radio link failure as specified in 5.3.10.3 or reconfiguration with sync failure as specified in 5.3.5.8.3:
 - 2> set the reestablishmentCellId in the VarRLF-Report to the global cell identity of the selected cell;
- 1> set the *ue-Identity* as follows:
 - 2> set the *c-RNTI* to the C-RNTI used in the source PCell (reconfiguration with sync or mobility from NR failure) or used in the PCell in which the trigger for the re-establishment occurred (other cases);
 - 2> set the *physCellId* to the physical cell identity of the source PCell (reconfiguration with sync or mobility from NR failure) or of the PCell in which the trigger for the re-establishment occurred (other cases);
 - 2> set the *shortMAC-I* to the 16 least significant bits of the MAC-I calculated:
 - 3> over the ASN.1 encoded as per clause 8 (i.e., a multiple of 8 bits) VarShortMAC-Input;
 - 3> with the K_{RRCint} key and integrity protection algorithm that was used in the source PCell (reconfiguration with sync or mobility from NR failure) or of the PCell in which the trigger for the re-establishment occurred (other cases); and
 - 3> with all input bits for COUNT, BEARER and DIRECTION set to binary ones;
- 1> set the reestablishmentCause as follows:
 - 2> if the re-establishment procedure was initiated due to reconfiguration failure as specified in 5.3.5.8.2:
 - 3> set the *reestablishmentCause* to the value *reconfigurationFailure*;

- 2> else if the re-establishment procedure was initiated due to reconfiguration with sync failure as specified in 5.3.5.8.3 (intra-NR handover failure) or 5.4.3.5 (inter-RAT mobility from NR failure):
 - 3> set the reestablishmentCause to the value handoverFailure;
- 2> else:
 - 3> set the reestablishmentCause to the value otherFailure:
- 1> re-establish PDCP for SRB1;
- 1> if the UE is acting as L2 U2N Remote UE:
 - 2> establish or re-established (e.g. via release and add) SL RLC entity for SRB1;
 - 2> apply the default configuration of SL-RLC1 as defined in 9.2.4 for SRB1;
 - 2> apply the default configuration of PDCP as defined in 9.2.1 for SRB1;
 - 2> apply the default configuration of SRAP as defined in 9.2.5 for SRB1;
- 1> else:
 - 2> re-establish RLC for SRB1;
 - 2> apply the default configuration defined in 9.2.1 for SRB1;
- 1> configure lower layers to suspend integrity protection and ciphering for SRB1;
- NOTE: Ciphering is not applied for the subsequent *RRCReestablishment* message used to resume the connection. An integrity check is performed by lower layers, but merely upon request from RRC.
- 1> resume SRB1;
- 1> if ta-Report is configured with value enabled and the UE supports TA reporting:
 - 2> indicate TA report initiation to lower layers;
- 1> submit the RRCReestablishmentRequest message to lower layers for transmission.

5.3.7.5 Reception of the *RRCReestablishment* by the UE

- 1> stop timer T301;
- 1> consider the current cell to be the PCell;
- 1> update the K_{gNB} key based on the current K_{gNB} key or the NH, using the received *nextHopChainingCount* value, as specified in TS 33.501 [11];
- 1> store the nextHopChainingCount value indicated in the RRCReestablishment message;
- 1> derive the K_{RRCenc} and K_{UPenc} keys associated with the previously configured *cipheringAlgorithm*, as specified in TS 33.501 [11];
- 1> derive the K_{RRCint} and K_{UPint} keys associated with the previously configured *integrityProtAlgorithm*, as specified in TS 33.501 [11].
- 1> request lower layers to verify the integrity protection of the *RRCReestablishment* message, using the previously configured algorithm and the K_{RRCint} key;
- 1> if the integrity protection check of the RRCReestablishment message fails:
 - 2> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'RRC connection failure', upon which the procedure ends;

- 1> configure lower layers to resume integrity protection for SRB1 using the previously configured algorithm and the K_{RRCint} key immediately, i.e., integrity protection shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
- 1> configure lower layers to resume ciphering for SRB1 using the previously configured algorithm and, the K_{RRCenc} key immediately, i.e., ciphering shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
- 1> release the measurement gap configuration indicated by the measGapConfig, if configured;
- 1> release the MUSIM gap configuration indicated by the *musim-GapConfig*, if configured;
- 1> release the FR2 UL gap configuration indicated by the *ul-GapFR2-Config*, if configured;
- 1> perform the L2 U2N Remote UE configuration procedure in accordance with the received *sl-L2RemoteUE Config* as specified in 5.3.5.16;
- 1> set the content of RRCReestablishmentComplete message as follows:
 - 2> if the UE has logged measurements available for NR and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 3> include the *logMeasAvailable* in the *RRCReestablishmentComplete* message;
 - 3> if Bluetooth measurement results are included in the logged measurements the UE has available for NR:
 - 4> include the *logMeasAvailableBT* in the *RRCReestablishmentComplete* message;
 - 3> if WLAN measurement results are included in the logged measurements the UE has available for NR:
 - 4> include the logMeasAvailableWLAN in the RRCReestablishmentComplete message;
 - 2> if the *sigLoggedMeasType* in *VarLogMeasReport* is included:
 - 3> if T330 timer is running and the logged measurements configuration is for NR:
 - 4> set sigLogMeasConfigAvailable to true in the RRCReestablishmentComplete message;
 - 3> else:
 - 4> if the UE has logged measurements available for NR:
 - 5> set sigLogMeasConfigAvailable to false in the RRCReestablishmentComplete message;
 - 2> if the UE has connection establishment failure or connection resume failure information available in VarConnEstFailReport or VarConnEstFailReportList and if the RPLMN is equal to plmn-Identity stored in VarConnEstFailReport or in at least one of the entries of VarConnEstFailReportList:
 - 3> include connEstFailInfoAvailable in the RRCReestablishmentComplete message;
 - 2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*; or
 - 2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* of TS 36.331 [10] and if the UE is capable of cross-RAT RLF reporting and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report* of TS 36.331 [10]:
 - 3> include rlf-InfoAvailable in the RRCReestablishmentComplete message;
 - 2> if the UE has successful handover information available in *VarSuccessHO-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessHO-Report*:
 - 3> include successHO-InfoAvailable in the RRCReestablishmentComplete message;
- 1> submit the RRCReestablishmentComplete message to lower layers for transmission;
- 1> if SIB21 is provided by the PCell:

- 2> if the UE initiated transmission of an *MBSInterestIndication* message during the last 1 second preceding detection of radio link failure:
 - 3> initiate transmission of an MBSInterestIndication message in accordance with 5.9.4;
- 1> the procedure ends.

5.3.7.6 T311 expiry

Upon T311 expiry, the UE shall:

- 1> if the procedure was initiated due to radio link failure or handover failure:
 - 2> set the *noSuitableCellFound* in the *VarRLF-Report* to *true*;
- 1> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'RRC connection failure'.

5.3.7.7 T301 expiry or selected cell/L2 U2N Relay UE no longer suitable

The UE shall:

- 1> if timer T301 expires; or
- 1> if the selected cell becomes no longer suitable according to the cell selection criteria as specified in TS 38.304 [20]; or
- 1> if the (re)selected L2 U2N Relay UE becomes unsuitable; or
- 1> upon receiption of NotificationMessageSidelink indicating relayUE-HO or relayUE-CellReselection:
 - 2> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'RRC connection failure'.

5.3.7.8 Reception of the *RRCSetup* by the UE

The UE shall:

1> perform the RRC connection establishment procedure as specified in 5.3.3.4.

5.3.8 RRC connection release

5.3.8.1 General

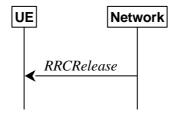


Figure 5.3.8.1-1: RRC connection release, successful

The purpose of this procedure is:

- to release the RRC connection, which includes the release of the established radio bearers (except for broadcast MRBs), BH RLC channels, Uu Relay RLC channels, PC5 Relay RLC channels as well as all radio resources; or
- to suspend the RRC connection only if SRB2 and at least one DRB or multicast MRB or, for IAB, SRB2, are setup, which includes the suspension of the established radio bearers (except for broadcast MRBs).

5.3.8.2 Initiation

The network initiates the RRC connection release procedure to transit a UE in RRC_CONNECTED to RRC_IDLE; or to transit a UE in RRC_CONNECTED to RRC_INACTIVE only if SRB2 and at least one DRB or multicast MRB or, for IAB, SRB2, is setup in RRC_CONNECTED; or to transit a UE in RRC_INACTIVE back to RRC_INACTIVE when the UE tries to resume (for resuming a suspended RRC connection or for initiating SDT); or to transit a UE in RRC_INACTIVE to RRC_IDLE when the UE tries to resume (for resuming of a suspended RRC connection or for initiating SDT). The procedure can also be used to release and redirect a UE to another frequency.

5.3.8.3 Reception of the *RRCRelease* by the UE

- 1> delay the following actions defined in this clause 60 ms from the moment the *RRCRelease* message was received or optionally when lower layers indicate that the receipt of the *RRCRelease* message has been successfully acknowledged, whichever is earlier;
- 1> stop timer T380, if running;
- 1> stop timer T320, if running;
- 1> if timer T316 is running;
 - 2> stop timer T316;
 - 2> clear the information included in *VarRLF-Report*, if any;
- 1> stop timer T350, if running;
- 1> stop timer T346g, if running;
- 1> if the AS security is not activated:
 - 2> ignore any field included in RRCRelease message except waitTime;
 - 2> perform the actions upon going to RRC_IDLE as specified in 5.3.11 with the release cause 'other' upon which the procedure ends;
- 1> if the RRCRelease message includes redirectedCarrierInfo indicating redirection to eutra:
 - 2> if *cnType* is included:
 - 3> after the cell selection, indicate the available CN Type(s) and the received cnType to upper layers;
- NOTE 1: Handling the case if the E-UTRA cell selected after the redirection does not support the core network type specified by the *cnType*, is up to UE implementation.
 - 2> if *voiceFallbackIndication* is included:
 - 3> consider the RRC connection release was for EPS fallback for IMS voice (see TS 23.502 [43]);
- 1> if the *RRCRelease* message includes the *cellReselectionPriorities*:
 - 2> store the cell reselection priority information provided by the *cellReselectionPriorities*;
 - 2> if the *t320* is included:
 - 3> start timer T320, with the timer value set according to the value of t320;
- 1> else:
 - 2> apply the cell reselection priority information broadcast in the system information;
- 1> if deprioritisationReq is included and the UE supports RRC connection release with deprioritisation:
 - 2> start or restart timer T325 with the timer value set to the *deprioritisationTimer* signalled;

- 2> store the deprioritisationReq until T325 expiry;
- NOTE 1a: The UE stores the deprioritisation request irrespective of any cell reselection absolute priority assignments (by dedicated or common signalling) and regardless of RRC connections in NR or other RATs unless specified otherwise.
- 1> if the RRCRelease includes the measIdleConfig:
 - 2> if T331 is running:
 - 3> stop timer T331;
 - 3> perform the actions as specified in 5.7.8.3;
 - 2> if the *measIdleConfig* is set to *setup*:
 - 3> store the received *measIdleDuration* in *VarMeasIdleConfig*;
 - 3> start timer T331 with the value set to measIdleDuration;
 - 3> if the *measIdleConfig* contains *measIdleCarrierListNR*:
 - 4> store the received *measIdleCarrierListNR* in *VarMeasIdleConfig*;
 - 3> if the *measIdleConfig* contains *measIdleCarrierListEUTRA*:
 - 4> store the received measIdleCarrierListEUTRA in VarMeasIdleConfig;
 - 3> if the measIdleConfig contains validityAreaList:
 - 4> store the received *validityAreaList* in *VarMeasIdleConfig*;
- 1> if the *RRCRelease* includes *suspendConfig*:
 - 2> reset MAC and release the default MAC Cell Group configuration, if any;
 - 2> apply the received *suspendConfig* except the received *nextHopChainingCount*;
 - 2> if the *sdt-Config* is configured:
 - 3> for each of the DRB in the *sdt-DRB-List*:
 - 4> consider the DRB to be configured for SDT;
 - 3> if *sdt-SRB2-Indication* is configured:
 - 4> consider the SRB2 to be configured for SDT;
 - 3> for each RLC bearer that is not suspended:
 - 4> re-establish the RLC entity as specified in TS 38.322 [4];
 - 3> for SRB2 (if it is resumed) and for SRB1:
 - 4> trigger the PDCP entity to perform SDU discard as specified in TS 38.323 [5];
 - 3> if sdt-MAC-PHY-CG-Config is configured:
 - 4> configure the PCell with the configured grant resources for SDT and instruct the MAC entity to start the *cg-SDT-TimeAlignmentTimer*;
 - 2> if srs-PosRRC-Inactive is configured:
 - 3> apply the configuration and instruct MAC to start the *inactivePosSRS-TimeAlignmentTimer*;
- NOTE 1b: The Network should provide full configuration to UE for SRS for Positioning in RRC_INACTIVE.
 - 2> remove all the entries within the MCG and the SCG VarConditionalReconfig, if any;

- 2> for each *measId* of the MCG *measConfig* and for each *measId* of the SCG *measConfig*, if configured, if the associated *reportConfig* has a *reportType* set to *condTriggerConfig*:
 - 3> for the associated *reportConfigId*:
 - 4> remove the entry with the matching *reportConfigId* from the *reportConfigList* within the *VarMeasConfig*;
 - 3> if the associated *measObjectId* is only associated to a *reportConfig* with *reportType* set to *condTriggerConfig*:
 - 4> remove the entry with the matching *measObjectId* from the *measObjectList* within the *VarMeasConfig*;
 - 3> remove the entry with the matching *measId* from the *measIdList* within the *VarMeasConfig*;
- 2> if the UE is acting as L2 U2N Remote UE:
 - 3> if the PC5-RRC connection with the U2N Relay UE is determined to be released:
 - 4> indicate upper layers to trigger PC5 unicast link release;
 - 3> else (i.e., maintain the PC5 RRC connection):
 - 4> establish or re-establish (e.g. via release and add) SL RLC entity for SRB1;
- 2> else:
 - 3> re-establish RLC entities for SRB1;
- 2> if the RRCRelease message with suspendConfig was received in response to an RRCResumeRequest or an RRCResumeRequest1:
 - 3> stop the timer T319 if running;
 - 3> in the stored UE Inactive AS context:
 - 4> replace the K_{gNB} and K_{RRCint} keys with the current K_{gNB} and K_{RRCint} keys;
 - 4> replace the *nextHopChainingCount* with the value of *nextHopChainingCount* received in the *RRCRelease* message;
 - 4> replace the *cellIdentity* with the *cellIdentity* of the cell the UE has received the *RRCRelease* message;
 - 4> if the suspendConfig contains the sl-UEIdentityRemote (i.e. the UE is a L2 U2N Remote UE):
 - 5> replace the C-RNTI with the value of the *sl-UEIdentityRemote*;
 - 5> replace the physical cell identity with the value of the *sl-PhysCellId* in *sl-ServingCellInfo* contained in the discovery message received from the connected L2 U2N Relay UE;
 - 4> else:
 - 5> replace the C-RNTI with the C-RNTI used in the cell (see TS 38.321 [3]) the UE has received the *RRCRelease* message;
 - 5> replace the physical cell identity with the physical cell identity of the cell the UE has received the *RRCRelease* message;
 - 3> replace the nextHopChainingCount with the value associated with the current K_{gNB};
 - 3> stop the timer T319a if running and consider SDT procedure is not ongoing;
- 2> else:
 - 3> store in the UE Inactive AS Context the nextHopChainingCount received in the RRCRelease message, the current K_{gNB} and K_{RRCint} keys, the ROHC state, the EHC context(s), the UDC state, the stored QoS flow to DRB mapping rules, the application layer measurement configuration, the C-RNTI used in the source

PCell, the *cellIdentity* and the physical cell identity of the source PCell, the *spCellConfigCommon* within *ReconfigurationWithSync* of the NR PSCell (if configured) and all other parameters configured except for:

- parameters within *ReconfigurationWithSync* of the PCell;
- parameters within *ReconfigurationWithSync* of the NR PSCell, if configured;
- parameters within *MobilityControlInfoSCG* of the E-UTRA PSCell, if configured;
- servingCellConfigCommonSIB;
- sl-L2RelayUE-Config, if configured;
- sl-L2RemoteUE-Config, if configured;

NOTE 1c: suspendConfig is not stored as part of UE Inactive AS Context, except for the fields explicitly specified.

- 3> store any previously or subsequently received application layer measurement reports for which no segment, or full message, has been submitted to lower layers for transmission;
- NOTE 2: NR sidelink communication/discovery related configurations and logged measurement configuration are not stored as UE Inactive AS Context, when UE enters RRC_INACTIVE.
 - 2> suspend all SRB(s) and DRB(s) and multicast MRB(s), except SRB0 and broadcast MRBs;
 - 2> indicate PDCP suspend to lower layers of all DRBs and multicast MRBs;
 - 2> release the SRAP entity, if configured;
 - 2> if the t380 is included:
 - 3> start timer T380, with the timer value set to *t380*;
 - 2> if the *RRCRelease* message is including the *waitTime*:
 - 3> start timer T302 with the value set to the waitTime;
 - 3> inform upper layers that access barring is applicable for all access categories except categories '0' and '2';
 - 2> if T390 is running:
 - 3> stop timer T390 for all access categories;
 - 3> perform the actions as specified in 5.3.14.4;
 - 2> indicate the suspension of the RRC connection to upper layers;
 - 2> if the UE is capable of L2 U2N Remote UE:
 - 3> enter RRC_INACTIVE, and perform either cell selection as specified in TS 38.304 [20], or relay selection as specified in clause 5.8.15.3, or both;
 - 2> else:
 - 3> enter RRC_INACTIVE and perform cell selection as specified in TS 38.304 [20];

1> else:

- 2> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with the release cause 'other'.
- NOTE 3: Whether to release the PC5 unicast link is left to L2 U2N Remote UE's implementation.
- NOTE 4: It is left to UE implementation whether to stop T430, if running, when going to RRC_INACTIVE.

5.3.8.4 T320 expiry

- 1> if T320 expires:
 - 2> if stored, discard the cell reselection priority information provided by the *cellReselectionPriorities* or inherited from another RAT;
 - 2> apply the cell reselection priority information broadcast in the system information.

5.3.8.5 UE actions upon the expiry of *DataInactivityTimer*

Upon receiving the expiry of DataInactivityTimer from lower layers while in RRC_CONNECTED, the UE shall:

1> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'RRC connection failure'.

5.3.8.6 T346g expiry

The UE shall:

- 1> if T346g expires:
 - 2> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'other'.

5.3.9 RRC connection release requested by upper layers

5.3.9.1 General

The purpose of this procedure is to release the RRC connection. Access to the current PCell may be barred as a result of this procedure.

5.3.9.2 Initiation

The UE initiates the procedure when upper layers request the release of the RRC connection as specified in TS 24.501 [23]. The UE shall not initiate the procedure for power saving purposes.

The UE shall:

- 1> if the upper layers indicate barring of the PCell:
 - 2> treat the PCell used prior to entering RRC_IDLE as barred according to TS 38.304 [20];
- 1> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'other'.

5.3.10 Radio link failure related actions

5.3.10.1 Detection of physical layer problems in RRC_CONNECTED

- 1> if any DAPS bearer is configured, upon receiving N310 consecutive "out-of-sync" indications for the source SpCell from lower layers and T304 is running:
 - 2> start timer T310 for the source SpCell.
- 1> upon receiving N310 consecutive "out-of-sync" indications for the SpCell from lower layers while neither T300, T301, T304, T311, T316 nor T319 are running:
 - 2> start timer T310 for the corresponding SpCell.

5.3.10.2 Recovery of physical layer problems

Upon receiving N311 consecutive "in-sync" indications for the SpCell from lower layers while T310 is running, the UE shall:

- 1> stop timer T310 for the corresponding SpCell.
- 1> stop timer T312 for the corresponding SpCell, if running.
- NOTE 1: In this case, the UE maintains the RRC connection without explicit signalling, i.e. the UE maintains the entire radio resource configuration.
- NOTE 2: Periods in time where neither "in-sync" nor "out-of-sync" is reported by L1 do not affect the evaluation of the number of consecutive "in-sync" or "out-of-sync" indications.

5.3.10.3 Detection of radio link failure

The UE shall:

- 1> if any DAPS bearer is configured and T304 is running:
 - 2> upon T310 expiry in source SpCell; or
 - 2> upon random access problem indication from source MCG MAC; or
 - 2> upon indication from source MCG RLC that the maximum number of retransmissions has been reached; or
 - 2> upon consistent uplink LBT failure indication from source MCG MAC:
 - 3> consider radio link failure to be detected for the source MCG i.e. source RLF;
 - 3> suspend the transmission and reception of all DRBs and multicast MRBs in the source MCG;
 - 3> reset MAC for the source MCG;
 - 3> release the source connection.

1> else:

- 2> during a DAPS handover: the following only applies for the target PCell;
- 2> upon T310 expiry in PCell; or
- 2> upon T312 expiry in PCell; or
- 2> upon random access problem indication from MCG MAC while neither T300, T301, T304, T311 nor T319 are running and SDT procedure is not ongoing; or
- 2> upon indication from MCG RLC that the maximum number of retransmissions has been reached while SDT procedure is not ongoing; or
- 2> if connected as an IAB-node, upon BH RLF indication received on BAP entity from the MCG; or
- 2> upon consistent uplink LBT failure indication from MCG MAC while T304 is not running:
 - 3> if the indication is from MCG RLC and CA duplication is configured and activated for MCG, and for the corresponding logical channel *allowedServingCells* only includes SCell(s):
 - 4> initiate the failure information procedure as specified in 5.7.5 to report RLC failure.
 - 3> else:
 - 4> consider radio link failure to be detected for the MCG, i.e. MCG RLF;
 - 4> discard any segments of segmented RRC messages stored according to 5.7.6.3;

NOTE: Void.

- 4> if AS security has not been activated:
 - 5> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'other';-
- 4> else if AS security has been activated but SRB2 and at least one DRB or multicast MRB or, for IAB, SRB2, have not been setup:
 - 5> store the radio link failure information in the *VarRLF-Report* as described in clause 5.3.10.5;
 - 5> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'RRC connection failure';
- 4> else:
 - 5> store the radio link failure information in the *VarRLF-Report* as described in clause 5.3.10.5;
 - 5> if T316 is configured; and
 - 5> if SCG transmission is not suspended; and
 - 5> if the SCG is not deactivated; and
 - 5> if neither PSCell change nor PSCell addition is ongoing (i.e. timer T304 for the NR PSCell is not running in case of NR-DC or timer T307 of the E-UTRA PSCell is not running as specified in TS 36.331 [10], clause 5.3.10.10, in NE-DC):
 - 6> initiate the MCG failure information procedure as specified in 5.7.3b to report MCG radio link failure.
 - 5> else:
 - 6> initiate the connection re-establishment procedure as specified in 5.3.7.

A L2/L3 U2N Relay UE shall:

- 1> upon detecting radio link failure:
 - 2> it either indicates to upper layers (to trigger PC5 unicast link release) or sends Notification message to the connected L2/L3 U2N Remote UE(s) in accordance with 5.8.9.10.

- 1> upon T310 expiry in PSCell; or
- 1> upon T312 expiry in PSCell; or
- 1> upon random access problem indication from SCG MAC; or
- 1> upon indication from SCG RLC that the maximum number of retransmissions has been reached; or
- 1> if connected as an IAB-node, upon BH RLF indication received on BAP entity from the SCG; or
- 1> upon consistent uplink LBT failure indication from SCG MAC:
 - 2> if the indication is from SCG RLC and CA duplication is configured and activated for SCG, and for the corresponding logical channel *allowedServingCells* only includes SCell(s):
 - 3> initiate the failure information procedure as specified in 5.7.5 to report RLC failure.
 - 2> else:
 - 3> consider radio link failure to be detected for the SCG, i.e. SCG RLF;
 - 3> if the SCG is deactivated:
 - 4> stop radio link monitoring on the SCG;
 - 4> indicate to lower layers to stop beam failure detection on the PSCell;

- 3> if MCG transmission is not suspended:
 - 4> initiate the SCG failure information procedure as specified in 5.7.3 to report SCG radio link failure.
- 3> else:
 - 4> if the UE is in NR-DC:
 - 5> initiate the connection re-establishment procedure as specified in 5.3.7;
 - 4> else (the UE is in (NG)EN-DC):
 - 5> initiate the connection re-establishment procedure as specified in TS 36.331 [10], clause 5.3.7;

5.3.10.4 RLF cause determination

The UE shall set the *rlf-Cause* in the *VarRLF-Report* as follows:

- 1> if the UE declares radio link failure due to T310 expiry:
 - 2> set the rlf-Cause as t310-Expiry;
- 1> else if the UE declares radio link failure due to the random access problem indication from MCG MAC:
 - 2> if the random access procedure was initiated for beam failure recovery:
 - 3> set the rlf-Cause as beamFailureRecoveryFailure;
 - 2> else:
 - 3> set the rlf-Cause as randomAccessProblem;
- 1> else if the UE declares radio link failure due to the reaching of maximum number of retransmissions from the MCG RLC:
 - 2> set the *rlf-Cause* as *rlc-MaxNumRetx*;
- 1> else if the UE declares radio link failure due to consistent uplink LBT failures:
 - 2> set the rlf-Cause as lbtFailure;
- 1> else if the IAB-MT declares radio link failure due to the reception of a BH RLF indication on BAP entity:
 - 2> set the *rlf-Cause* as *bh-rlfRecoveryFailure*.
- 1> else if the UE declares radio link failure due to T312 expiry:
 - 2> set the rlf-Cause as t312-Expiry;

5.3.10.5 RLF report content determination

The UE shall determine the content in the VarRLF-Report as follows:

- 1> clear the information included in *VarRLF-Report*, if any;
- 1> set the plmn-IdentityList to include the list of EPLMNs stored by the UE (i.e. includes the RPLMN);
- 1> set the *measResultLastServCell* to include the cell level RSRP, RSRQ and the available SINR, of the source PCell (in case HO failure) or PCell (in case RLF) based on the available SSB and CSI-RS measurements collected up to the moment the UE detected failure;
- 1> if the SS/PBCH block-based measurement quantities are available:
 - 2> set the rsIndexResults in measResultLastServCell to include all the available measurement quantities of the source PCell (in case HO failure) or PCell (in case RLF), ordered such that the highest SS/PBCH block RSRP is listed first if SS/PBCH block RSRP measurement results are available, otherwise the highest SS/PBCH block RSRQ is listed first if SS/PBCH block RSRQ measurement results are available, otherwise

the highest SS/PBCH block SINR is listed first, based on the available SS/PBCH block based measurements collected up to the moment the UE detected failure;

- 1> if the CSI-RS based measurement quantities are available:
 - 2> set the rsIndexResults in measResultLastServCell to include all the available measurement quantities of the source PCell (in case HO failure) or PCell (in case RLF), ordered such that the highest CSI-RS RSRP is listed first if CSI-RS RSRP measurement results are available, otherwise the highest CSI-RS RSRQ is listed first if CSI-RS RSRQ measurement results are available, otherwise the highest CSI-RS SINR is listed first, based on the available CSI-RS based measurements collected up to the moment the UE detected failure;
- 1> set the *ssbRLMConfigBitmap* and/or *csi-rsRLMConfigBitmap* in *measResultLastServCell* to include the radio link monitoring configuration of the source PCell (in case HO failure) or PCell (in case RLF), if available;
- 1> for each of the configured *measObjectNR* in which measurements are available:
 - 2> if the SS/PBCH block-based measurement quantities are available:
 - 3> set the *measResultListNR* in *measResultNeighCells* to include all the available measurement quantities of the best measured cells, other than the source PCell (in case HO failure) or PCell (in case RLF), ordered such that the cell with highest SS/PBCH block RSRP is listed first if SS/PBCH block RSRP measurement results are available, otherwise the cell with highest SS/PBCH block RSRQ is listed first if SS/PBCH block RSRQ measurement results are available, otherwise the cell with highest SS/PBCH block SINR is listed first, based on the available SS/PBCH block based measurements collected up to the moment the UE detected failure;
 - 4> for each neighbour cell included, include the optional fields that are available;
- NOTE 0a: For the neighboring cells included in *measResultListNR* in *measResultNeighCells* ordered based on the SS/PBCH block measurement quantities, UE also includes the CSI-RS based measurement quantities, if available.
 - 2> if the CSI-RS based measurement quantities are available:
 - 3> set the *measResultListNR* in *measResultNeighCells* to include all the available measurement quantities of the best measured cells, other than the source PCell (in case HO failure) or PCell (in case RLF), ordered such that the cell with highest CSI-RS RSRP is listed first if CSI-RS RSRP measurement results are available, otherwise the cell with highest CSI-RS RSRQ is listed first if CSI-RS RSRQ measurement results are available, otherwise the cell with highest CSI-RS SINR is listed first, based on the available CSI-RS based measurements collected up to the moment the UE detected radio link failure;
 - 4> for each neighbour cell included, include the optional fields that are available;
- NOTE 0b:For ordering the neighboring cells based on the CSI-RS measurement quantities, UE includes measurements only for the cells not yet included in *measResultListNR* in *measResultNeighCells* to avoid overriding SS/PBCH block-based ordered measurements.
 - 2> for each neighbour cell, if any, included in measResultListNR in measResultNeighCells:
 - 3> if the UE supports RLF-Report for conditional handover and if the neighbour cell is one of the candidate cells for which the *reconfigurationWithSync* is included in the *masterCellGroup* in the MCG *VarConditionalReconfig* at the moment of the detected failure:
 - 4> set *choConfig* in *MeasResult2NR* to the execution condition for each *measId* within *condTriggerConfig* associated to the neighbour cell within the MCG *VarConditionalReconfig*;
 - 4> if the first entry of *choConfig* corresponds to a fulfilled execution condition at the moment of handover failure, or radio link failure; or
 - 4> if the second entry of *choConfig*, if available, corresponds to a fulfilled execution condition at the moment of handover failure, or radio link failure:
 - 5> set *firstTriggeredEvent* to the execution condition *condFirstEvent* corresponding to the first entry of *choConfig* or to the execution condition *condSecondEvent* corresponding to the second entry of *choConfig*, whichever execution condition was fulfilled first in time;

- 5> set *timeBetweenEvents* to the elapsed time between the point in time of fullfilling the condition in *choConfig* that was fulfilled first in time, and the point in time of fullfilling the condition in *choConfig* that was fulfilled second in time, if both the first execution condition corresponding to the first entry and the second execution condition corresponding to the second entry in the *choConfig* were fullfilled;
- 1> for each of the configured EUTRA frequencies in which measurements are available;
 - 2> set the *measResultListEUTRA* in *measResultNeighCells* to include the best measured cells ordered such that the cell with highest RSRP is listed first if RSRP measurement results are available, otherwise the cell with highest RSRQ is listed first, and based on measurements collected up to the moment the UE detected failure;
 - 3> for each neighbour cell included, include the optional fields that are available;
- NOTE 1: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Exclude-listed cells are not required to be reported.
- 1> set the c-RNTI to the C-RNTI used in the source PCell (in case HO failure) or PCell (in case RLF);
- 1> if the failure is detected due to reconfiguration with sync failure as described in 5.3.5.8.3, set the fields in *VarRLF-report* as follows:
 - 2> set the *connectionFailureType* to *hof*;
 - 2> if the UE supports RLF-Report for DAPS handover and if any DAPS bearer was configured while T304 was running:
 - 3> set *lastHO-Type* to *daps*;
 - 3> if radio link failure was detected in the source PCell, according to clause 5.3.10.3:
 - 4> set *timeConnSourceDAPS-Failure* to the time between the initiation of the DAPS handover execution and the radio link failure detected in the source PCell while T304 was running;
 - 4> set the *rlf-Cause* to the trigger for detecting the source radio link failure in accordance with clause 5.3.10.4:
 - 2> if the UE supports RLF-Report for conditional handover and if configuration of the conditional handover is available in the MCG *VarConditionalReconfig* at the moment of the handover failure:
 - 3> if the UE executed a conditional handover toward target PCell according to the *condRRCReconfig* of the target PCell:
 - 4> set timeSinceCHO-Reconfig to the time elapsed between the execution of the last RRCReconfiguration message including reconfigurationWithSync for the target PCell of the failed conditional handover, and the reception in the source PCell of the last conditionalReconfiguration including the condRRCReconfig of the target PCell of the failed conditional handover;
 - 3> else:
 - 4> set timeSinceCHO-Reconfig to the time elapsed between the execution of the last RRCReconfiguration message including reconfigurationWithSync for the target PCell of the failed handover, and the reception in the source PCell of the last conditionalReconfiguration including the condRRCReconfig;
 - 3> set *choCandidateCellList* to include the global cell identity, if available, and otherwise to the physical cell identity and carrier frequency of each of the candidate target cells for conditional handover included in *condRRCReconfig* within the MCG *VarConditionalReconfig* at the time of the failed handover, excluding the candidate target cells included in *measResulNeighCells*;
 - 2> if the UE supports RLF-Report for conditional handover and if the last executed *RRCReconfiguration* message including *reconfigurationWithSync* was concerning a conditional handover:
 - 3> set *lastHO-Type* to *cho*;

- 2> set the *nrFailedPCellId* in *failedPCellId* to the global cell identity and tracking area code, if available, and otherwise to the physical cell identity and carrier frequency of the target PCell of the failed handover;
- 2> include *nrPreviousCell* in *previousPCellId* and set it to the global cell identity and tracking area code of the PCell where the last *RRCReconfiguration* message including *reconfigurationWithSync* was received;
- 2> set the *timeConnFailure* to the elapsed time since the execution of the last *RRCReconfiguration* message including the *reconfigurationWithSync*;
- 1> else if the failure is detected due to Mobility from NR failure as described in 5.4.3.5, set the fields in *VarRLF-report* as follows:
 - 2> set the *connectionFailureType* to *hof*;
 - 2> if last *MobilityFromNRCommand* concerned a failed inter-RAT handover from NR to E-UTRA and if the UE supports Radio Link Failure Report for Inter-RAT MRO EUTRA (NR to EUTRA):
 - 3> set the *eutraFailedPCellId* in *failedPCellId* to the global cell identity and tracking area code, if available, and otherwise to the physical cell identity and carrier frequency of the target PCell of the failed handover;
 - 2> include *nrPreviousCell* in *previousPCellId* and set it to the global cell identity and tracking area code of the PCell where the last *MobilityFromNRCommand* message was received;
 - 2> set the *timeConnFailure* to the elapsed time since the initialization of the handover associated to the last *MobilityFromNRCommand* message;
- 1> else if the failure is detected due to radio link failure as described in 5.3.10.3, set the fields in *VarRLF-report* as follows:
 - 2> set the *connectionFailureType* to *rlf*;
 - 2> set the rlf-Cause to the trigger for detecting radio link failure in accordance with clause 5.3.10.4;
 - 2> set the *nrFailedPCellId* in *failedPCellId* to the global cell identity and the tracking area code, if available, and otherwise to the physical cell identity and carrier frequency of the PCell where radio link failure is detected:
 - 2> if an RRCReconfiguration message including the reconfigurationWithSync was received before the connection failure:
 - 3> if the last executed *RRCReconfiguration* message including the *reconfigurationWithSync* concerned an intra NR handover and it was received while connected to the previous PCell to which the UE was connected before connecting to the PCell where radio link failure is detected; and
 - 3> if the PCell in which the radio link failure was detected was a result of cell selection and the T311 was not running at the time of PCell selection:
 - 4> include the *nrPreviousCell* in *previousPCellId* and set it to the global cell identity and the tracking area code of the PCell where the last executed *RRCReconfiguration* message including *reconfigurationWithSync* was received;
 - 4> if the last executed *RRCReconfiguration* message including *reconfigurationWithSync* was concerning a DAPS handover:
 - 5> set *lastHO-Type* to *daps*;
 - 4> else if the last executed *RRCReconfiguration* message including *reconfigurationWithSync* was concerning a conditional handover:
 - 5> set *lastHO-Type* to *cho*;
 - 4> set the *timeConnFailure* to the elapsed time since the execution of the last *RRCReconfiguration* message including the *reconfigurationWithSync*;

- 3> else if the last *RRCReconfiguration* message including the *reconfigurationWithSync* concerned a handover to NR from E-UTRA and if the UE supports Radio Link Failure Report for Inter-RAT MRO EUTRA:
 - 4> include the *eutraPreviousCell* in *previousPCellId* and set it to the global cell identity and the tracking area code of the E-UTRA PCell where the last *RRCReconfiguration* message including *reconfigurationWithSync* was received embedded in E-UTRA RRC message *MobilityFromEUTRACommand* message as specified in TS 36.331 [10] clause 5.4.3.3;
 - 4> set the *timeConnFailure* to the elapsed time since reception of the last *RRCReconfiguration* message including the *reconfigurationWithSync* embedded in E-UTRA RRC message *MobilityFromEUTRACommand* message as specified in TS 36.331 [10] clause 5.4.3.3;
- 2> if configuration of the conditional handover is available in the MCG *VarConditionalReconfig* at the moment of declaring the radio link failure:
 - 3> set timeSinceCHO-Reconfig to the time elapsed between the detection of the radio link failure, and the reception, in the source PCell, of the last conditionalReconfiguration including the condRRCReconfig message;
 - 3> set *choCandidateCellList* to include the global cell identity if available, and otherwise to the physical cell identity and carrier frequency of each of all the candidate target cells for conditional handover included in *condRRCReconfig* within the MCG *VarConditionalReconfig* at the time of radio link failure, excluding the candidate target cells included in *measResulNeighCells*;
- 1> if connectionFailureType is rlf and the rlf-Cause is set to randomAccessProblem or beamFailureRecoveryFailure; or
- 1> if connectionFailureType is hof and if the failed handover is an intra-RAT handover:
 - 2> set the *ra-InformationCommon* to include the random-access related information as described in clause 5.7.10.5;
- 1> if available, set the *locationInfo* as in 5.3.3.7.

The UE may discard the radio link failure information or handover failure information, i.e. release the UE variable *VarRLF-Report*, 48 hours after the radio link failure/handover failure is detected.

NOTE 2: In this clause, the term 'handover failure' has been used to refer to 'reconfiguration with sync failure'.

5.3.11 UE actions upon going to RRC_IDLE

- 1> reset MAC;
- 1> set the variable *pendingRNA-Update* to *false*, if that is set to *true*;
- 1> if going to RRC_IDLE was triggered by reception of the RRCRelease message including a waitTime:
 - 2> if T302 is running:
 - 3> stop timer T302;
 - 2> start timer T302 with the value set to the waitTime;
 - 2> inform upper layers that access barring is applicable for all access categories except categories '0' and '2'.
- 1> else:
 - 2> if T302 is running:
 - 3> stop timer T302;
 - 3> perform the actions as specified in 5.3.14.4;

- 1> if T390 is running:
 - 2> stop timer T390 for all access categories;
 - 2> perform the actions as specified in 5.3.14.4;
- 1> if the UE is leaving RRC_INACTIVE:
 - 2> if going to RRC_IDLE was not triggered by reception of the RRCRelease message:
 - 3> if stored, discard the cell reselection priority information provided by the cellReselectionPriorities;
 - 3> stop the timer T320, if running;
 - 2> if T319a is running:
 - 3> stop timer T319a;
 - 3> consider SDT procedure is not ongoing;
- 1> stop all timers that are running except T302, T320, T325, T330, T331, T400 and T430;
- 1> discard the UE Inactive AS context, if any;
- 1> release the *suspendConfig*, if configured;
- 1> remove all the entries within the MCG and the SCG VarConditionalReconfig, if any;
- 1> for each measId, if the associated reportConfig has a reportType set to condTriggerConfig:
 - 2> for the associated *reportConfigId*:
 - 3> remove the entry with the matching reportConfigId from the reportConfigList within the VarMeasConfig;
 - 2> if the associated *measObjectId* is only associated to a *reportConfig* with *reportType* set to *condTriggerConfig*:
 - 3> remove the entry with the matching measObjectId from the measObjectList within the VarMeasConfig;
 - 2> remove the entry with the matching measId from the measIdList within the VarMeasConfig;
- 1> discard the K_{gNB} key, the S- K_{gNB} key, the S- K_{eNB} key, the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key, if any;
- 1> release all radio resources, including release of the RLC entity, the BAP entity, the MAC configuration and the associated PDCP entity and SDAP for all established RBs (except for broadcast MRBs), BH RLC channels, Uu Relay RLC channels, PC5 Relay RLC channels and SRAP entity;
- 1> indicate the release of the RRC connection to upper layers together with the release cause;
- 1> inform upper layers about the release of all application layer measurement configurations;
- 1> discard any application layer measurement reports which were not yet submitted to lower layers for transmission;
- 1> discard any segments of segmented RRC messages stored according to 5.7.6.3;
- 1> except if going to RRC_IDLE was triggered by inter-RAT cell reselection while the UE is in RRC_INACTIVE or RRC_IDLE or when selecting an inter-RAT cell while T311 was running or when selecting an E-UTRA cell for EPS fallback for IMS voice as specified in 5.4.3.5:
 - 2> if the UE is capable of L2 U2N Remote UE:
 - 3> enter RRC_IDLE, and perform either cell selection as specified in TS 38.304 [20], or relay selection as specified in clause 5.8.15.3, or both;
 - 2> else:

3> enter RRC_IDLE and perform cell selection as specified in TS 38.304 [20];

NOTE 1: Whether to release the PC5 unicast link is left to L2 U2N Remote UE's implementation.

NOTE 2: It is left to UE implementation whether to stop T430, if running, when going to RRC_IDLE.

5.3.12 UE actions upon PUCCH/SRS release request

Upon receiving a PUCCH release request from lower layers, for all bandwidth parts of an indicated serving cell the UE shall:

1> release PUCCH-CSI-Resources configured in CSI-ReportConfig;

1> release SchedulingRequestResourceConfig instances configured in PUCCH-Config.

Upon receiving an SRS release request from lower layers, for all bandwidth parts of an indicated serving cell the UE shall:

1> release SRS-Resource instances configured in SRS-Config.

Upon receiving a positioning SRS configuration for RRC_INACTIVE release request from lower layers, the UE shall:

1> release the configured *srs-PosRRC-Inactive*.

5.3.13 RRC connection resume

5.3.13.1 General

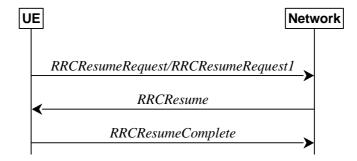


Figure 5.3.13.1-1: RRC connection resume, successful

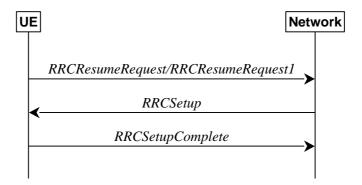


Figure 5.3.13.1-2: RRC connection resume fallback to RRC connection establishment, successful



Figure 5.3.13.1-3: RRC connection resume followed by network release, successful

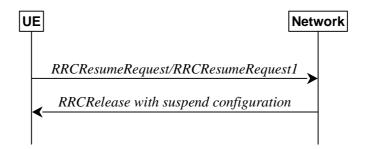


Figure 5.3.13.1-4: RRC connection resume followed by network suspend, successful

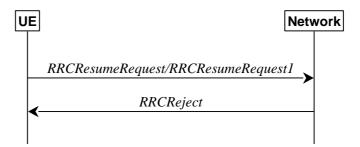


Figure 5.3.13.1-5: RRC connection resume, network reject

The purpose of this procedure is to resume a suspended RRC connection, including resuming SRB(s), DRB(s) and multicast MRB(s) or perform an RNA update. This procedure is also used to initiate SDT in RRC_INACTIVE.

5.3.13.1a Conditions for resuming RRC Connection for NR sidelink communication/discovery/V2X sidelink communication

For NR sidelink communication/discovery an RRC connection is resumed only in the following cases:

- 1> if configured by upper layers to transmit NR sidelink communication/discovery and related data is available for transmission:
 - 2> if the frequency on which the UE is configured to transmit NR sidelink communication is included in *sl-FreqInfoList* within *SIB12* provided by the cell on which the UE camps; and if the valid version of *SIB12* does not include *sl-TxPoolSelectedNormal* for the concerned frequency; or
 - 2> if the frequency on which the UE is configured to transmit NR sidelink discovery is included in *sl-FreqInfoList* within *SIB12* provided by the cell on which the UE camps; and if the valid version of *SIB12* does not include *sl-DiscTxPoolSelected* or *sl-TxPoolSelectedNormal* for the concerned frequency;

For L2 U2N Relay UE in RRC_INACTIVE, an RRC connection establishment is resumed in the following cases:

1> if any message is received from the L2 U2N Remote UE via SL-RLC0 as specified in 9.1.1.4 or SL-RLC1 as specified in 9.2.4;

For V2X sidelink communication an RRC connection resume is initiated only when the conditions specified for V2X sidelink communication in clause 5.3.3.1a of TS 36.331 [10] are met.

NOTE: Upper layers initiate an RRC connection resume (except if the RRC connection resume is initiated at the L2 U2N Relay UE upon reception of a message from a L2 U2N Remote UE via SL-RLC0 or SL-RLC1). The interaction with NAS is left to UE implementation.

5.3.13.1b Conditions for initiating SDT

A UE in RRC_INACTIVE initiates the resume procedure for SDT when all of the following conditions are fulfilled:

- 1> the upper layers request resumption of RRC connection; and
- 1> SIB1 includes sdt-ConfigCommon; and
- 1> sdt-Config is configured; and
- 1> all the pending data in UL is mapped to the radio bearers configured for SDT; and
- 1> lower layers indicate that conditions for initiating SDT as specified in TS 38.321 [3] are fulfilled.

NOTE: How the UE determines that all pending data in UL is mapped to radio bearers configured for SDT is left to UE implementation.

5.3.13.2 Initiation

The UE initiates the procedure when upper layers or AS (when responding to RAN paging, upon triggering RNA updates while the UE is in RRC_INACTIVE, for NR sidelink communication/discovery/V2X sidelink communication as specified in clause 5.3.13.1a) requests the resume of a suspended RRC connection or requests the resume for initiating SDT as specified in clause 5.3.13.1b.

The UE shall ensure having valid and up to date essential system information as specified in clause 5.2.2.2 before initiating this procedure.

Upon initiation of the procedure, the UE shall:

- 1> if the resumption of the RRC connection is triggered by response to NG-RAN paging:
 - 2> select '0' as the Access Category;
 - 2> perform the unified access control procedure as specified in 5.3.14 using the selected Access Category and one or more Access Identities provided by upper layers;
 - 3> if the access attempt is barred, the procedure ends;
- 1> else if the resumption of the RRC connection is triggered by upper layers:
 - 2> if the upper layers provide an Access Category and one or more Access Identities:
 - 3> perform the unified access control procedure as specified in 5.3.14 using the Access Category and Access Identities provided by upper layers;
 - 4> if the access attempt is barred, the procedure ends;
 - 2> if the upper layers provide NSAG information and one or more S-NSSAI(s) triggering the access attempt (TS 23.501 [32] and TS 24.501 [23]):
 - 3> apply the NSAG with highest NSAG priority among the NSAGs that are included in *SIB1* (i.e., in *FeatureCombination* and in *RA-PrioritizationSliceInfo*), and that are associated with the S-NSSAI(s) triggering the access attempt, in the Random Access procedure (TS 38.321 [3], clause 5.1);
 - 2> if the resumption occurs after release with redirect with *mpsPriorityIndication*:
 - 3> set the resumeCause to mps-PriorityAccess;
 - 2> else:
 - 3> set the *resumeCause* in accordance with the information received from upper layers;

1> else if the resumption of the RRC connection is triggered due to an RNA update as specified in 5.3.13.8:

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- 2> if an emergency service is ongoing:
- NOTE 1: How the RRC layer in the UE is aware of an ongoing emergency service is up to UE implementation.
 - 3> select '2' as the Access Category;
 - 3> set the resumeCause to emergency;
 - 2> else:
 - 3> select '8' as the Access Category;
 - 2> perform the unified access control procedure as specified in 5.3.14 using the selected Access Category and one or more Access Identities to be applied as specified in TS 24.501 [23];
 - 3> if the access attempt is barred:
 - 4> set the variable *pendingRNA-Update* to *true*;
 - 4> the procedure ends;
- NOTE 2: In case the L2 U2N Relay UE initiates RRC connection resume triggered by reception of message from a L2 U2N Remote UE via SL-RLC0 or SL-RLC1 as specified in 5.3.13.1a, the L2 U2N Relay UE sets the resumeCause by implementation, but it can only set the emergency, mps-PriorityAccess, or mcs-PriorityAccess as resumeCause, if the same cause value in the message received from the L2 U2N Remote UE via SL-RLC0.
- 1> if the UE is in NE-DC or NR-DC:
 - 2> if the UE does not support maintaining SCG configuration upon connection resumption:
 - 3> release the MR-DC related configurations (i.e., as specified in 5.3.5.10) from the UE Inactive AS context, if stored;
- 1> if the UE does not support maintaining the MCG SCell configurations upon connection resumption:
 - 2> release the MCG SCell(s) from the UE Inactive AS context, if stored;
- 1> if the UE is acting as L2 U2N Remote UE:
 - 2> establish a SRAP entity as specified in TS 38.351 [66], if no SRAP entity has been established;
 - 2> apply the default configuration of SL-RLC1 as defined in 9.2.4 for SRB1;
 - 2> apply the default PDCP configuration as defined in 9.2.1 for SRB1;
 - 2> apply the default configuration of SRAP as defined in 9.2.5 for SRB1;
- 1> else:
 - 2> apply the default L1 parameter values as specified in corresponding physical layer specifications, except for the parameters for which values are provided in *SIB1*;
 - 2> apply the default SRB1 configuration as specified in 9.2.1;
 - 2> apply the default MAC Cell Group configuration as specified in 9.2.2;
- 1> release delayBudgetReportingConfig from the UE Inactive AS context, if stored;
- 1> stop timer T342, if running;
- 1> release overheating Assistance Config from the UE Inactive AS context, if stored;
- 1> stop timer T345, if running;
- 1> release idc-AssistanceConfig from the UE Inactive AS context, if stored;

- 1> release drx-PreferenceConfig for all configured cell groups from the UE Inactive AS context, if stored;
- 1> stop all instances of timer T346a, if running;
- 1> release maxBW-PreferenceConfig and maxBW-PreferenceConfigFR2-2 for all configured cell groups from the UE Inactive AS context, if stored;
- 1> stop all instances of timer T346b, if running;
- 1> release maxCC-PreferenceConfig for all configured cell groups from the UE Inactive AS context, if stored;
- 1> stop all instances of timer T346c, if running;
- 1> release maxMIMO-LayerPreferenceConfig and maxMIMO-LayerPreferenceConfigFR2-2 for all configured cell groups from the UE Inactive AS context, if stored;
- 1> stop all instances of timer T346d, if running;
- 1> release minSchedulingOffsetPreferenceConfig and minSchedulingOffsetPreferenceConfigExt for all configured cell groups from the UE Inactive AS context, if stored;
- 1> stop all instances of timer T346e, if running;
- 1> release rlm-RelaxationReportingConfig for all configured cell groups from the UE Inactive AS context, if stored;
- 1> stop all instances of timer T346j, if running;
- 1> release bfd-RelaxationReportingConfig for all configured cell groups from the UE Inactive AS context, if stored;
- 1> stop all instances of timer T346k, if running;
- 1> release *releasePreferenceConfig* from the UE Inactive AS context, if stored;
- 1> release wlanNameList from the UE Inactive AS context, if stored;
- 1> release btNameList from the UE Inactive AS context, if stored;
- 1> release *sensorNameList* from the UE Inactive AS context, if stored;
- 1> release *obtainCommonLocation* from the UE Inactive AS context, if stored;
- 1> stop timer T346f, if running;
- 1> stop timer T346i, if running;
- 1> release referenceTimePreferenceReporting from the UE Inactive AS context, if stored;
- 1> release sl-AssistanceConfigNR from the UE Inactive AS context, if stored;
- 1> release *musim-GapAssistanceConfig* from the UE Inactive AS context, if stored and stop timer T346h, if running;
- 1> release *musim-GapConfig* from the UE Inactive AS context, if stored;
- 1> release *musim-LeaveAssistanceConfig* from the UE Inactive AS context, if stored;
- 1> release propDelayDiffReportConfig from the UE Inactive AS context, if stored;
- 1> release *ul-GapFR2-PreferenceConfig*, if configured;
- 1> release rrm-MeasRelaxationReportingConfig from the UE Inactive AS context, if stored;
- 1> if the UE is acting as L2 U2N Remote UE:
 - 2> apply the specified configuration of SL-RLC0 used for the delivery of RRC message over SRB0 as specified in 9.1.1.4;
 - 2> apply the SDAP configuration and PDCP configuration as specified in 9.1.1.2 for SRB0;

- 1> else:
 - 2> apply the CCCH configuration as specified in 9.1.1.2;
 - 2> apply the *timeAlignmentTimerCommon* included in *SIB1*;
- 1> if *sdt-MAC-PHY-CG-Config* is configured:
 - 2> if the resume procedure is initiated in a cell that is different to the PCell in which the UE received the stored *sdt-MAC-PHY-CG-Config*:
 - 3> release the stored *sdt-MAC-PHY-CG-Config*;
 - 3> instruct the MAC entity to stop the *cg-SDT-TimeAlignmentTimer*, if it is running;
- 1> if conditions for initiating SDT in accordance with 5.3.13.1b are fulfilled:
 - 2> consider the resume procedure is initiated for SDT;
 - 2> start timer T319a when the lower layers first transmit the CCCH message;
 - 2> consider SDT procedure is ongoing;
- 1> else:
 - 2> start timer T319;
 - 2> instruct the MAC entity to stop the *cg-SDT-TimeAlignmentTimer*, if it is running;
- 1> if ta-Report is configured with value enabled and the UE supports TA reporting:
 - 2> indicate TA report initiation to lower layers;
- 1> set the variable *pendingRNA-Update* to *false*;
- 1> release *successHO-Config* from the UE Inactive AS context, if stored;
- 1> initiate transmission of the RRCResumeRequest message or RRCResumeRequest1 in accordance with 5.3.13.3.

5.3.13.3 Actions related to transmission of *RRCResumeRequest* or *RRCResumeRequest1* message

The UE shall set the contents of RRCResumeRequest or RRCResumeRequest1 message as follows:

- 1> if field *useFullResumeID* is signalled in *SIB1*:
 - 2> select RRCResumeRequest1 as the message to use;
 - 2> set the resumeIdentity to the stored fullI-RNTI value;
- 1> else:
 - 2> select RRCResumeRequest as the message to use;
 - 2> set the resumeIdentity to the stored shortI-RNTI value;
- 1> restore the RRC configuration, RoHC state, the EHC context(s), the UDC state, the stored QoS flow to DRB mapping rules and the K_{gNB} and K_{RRCint} keys from the stored UE Inactive AS context except for the following:
 - masterCellGroup;
 - mrdc-SecondaryCellGroup, if stored; and
 - pdcp-Config;
- 1> set the *resumeMAC-I* to the 16 least significant bits of the MAC-I calculated:
 - 2> over the ASN.1 encoded as per clause 8 (i.e., a multiple of 8 bits) VarResumeMAC-Input;

- 2> with the K_{RRCint} key in the UE Inactive AS Context and the previously configured integrity protection algorithm; and
- 2> with all input bits for COUNT, BEARER and DIRECTION set to binary ones;
- 1> derive the K_{gNB} key based on the current K_{gNB} key or the NH, using the *nextHopChainingCount* value received in the previous *RRCRelease* message and stored in the UE Inactive AS Context, as specified in TS 33.501 [11];
- 1> derive the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key;
- 1> configure lower layers to apply integrity protection for all radio bearers except SRB0 and MRBs using the configured algorithm and the K_{RRCint} key and K_{UPint} key derived in this clause immediately, i.e., integrity protection shall be applied to all subsequent messages received and sent by the UE;
- NOTE 1: Only DRBs with previously configured UP integrity protection shall resume integrity protection.
- 1> configure lower layers to apply ciphering for all radio bearers except SRB0 and MRBs and to apply the configured ciphering algorithm, the K_{RRCenc} key and the K_{UPenc} key derived in this clause, i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE;
- 1> re-establish PDCP entities for SRB1;
- 1> resume SRB1;
- 1> if the resume procedure is initiated for SDT:
 - 2> for each radio bearer that is configured for SDT and for SRB1:
 - 3> restore the *RLC-BearerConfig* associated with the RLC bearers of *masterCellGroup* and *pdcp-Config* from the UE Inactive AS context;
 - 3> if the radio bearer is a DRB configured with Ethernet Header Compression:
 - 4> indicate to lower layer that ethernetHeaderCompression is not configured;
 - 3> if the radio bearer is a DRB configured with UDC:
 - 4> indicate to lower layer that *uplinkDataCompression* is not configured;
 - 3> if the radio bearer is a DRB configured with ROHC function:
 - 4> if *sdt-DRB-ContinueROHC* is set to *cell* and the resume procedure is initiated in a cell that is the same as the PCell in which the UE received the previous *RRCRelease* message; or
 - 4> if *sdt-DRB-ContinueROHC* is set to *rna* and the resume procedure is initiated in a cell belonging to the same RNA as the PCell in which the UE received the previous *RRCRelease* message:
 - 5> indicate to lower layer that *drb-continueROHC* is configured;
 - 4> else:
 - 5> indicate to lower layer that *drb-continueROHC* is not configured;
 - 3> re-establish PDCP entity for the radio bearer that is configured for SDT without triggering PDCP status report;
 - 2> resume all the radio bearers that are configured for SDT;
- 1> submit the selected message RRCResumeRequest or RRCResumeRequest1 for transmission to lower layers.
- NOTE 2: Only DRBs with previously configured UP ciphering shall resume ciphering.

If lower layers indicate an integrity check failure while T319 is running or SDT procedure is ongoing, perform actions specified in 5.3.13.5.

If the UE is a RedCap UE and the RedCap-specific initial downlink BWP is not associated with CD-SSB, the UE may continue cell re-selection related measurements as well as cell re-selection evaluation, otherwise the UE shall continue

cell re-selection related measurements as well as cell re-selection evaluation. If the conditions for cell re-selection are fulfilled, the UE shall perform cell re-selection as specified in 5.3.13.6.

NOTE 3: For L2 U2N Remote UE in RRC_INACTIVE, the cell (re)selection procedure as specified in TS 38.304 [20] and relay (re)selection procedure as specified in 5.8.15.3 are performed independently and it is up to UE implementation to select either a cell or a L2 U2N Relay UE.

5.3.13.4 Reception of the *RRCResume* by the UE

- 1> stop timer T319, if running;
- 1> stop timer T319a, if running and consider SDT procedure is not ongoing;
- 1> stop timer T380, if running;
- 1> if T331 is running:
 - 2> stop timer T331;
 - 2> perform the actions as specified in 5.7.8.3;
- 1> if the *RRCResume* includes the *fullConfig*:
 - 2> perform the full configuration procedure as specified in 5.3.5.11;
- 1> else:
 - 2> if the RRCResume does not include the restoreMCG-SCells:
 - 3> release the MCG SCell(s) from the UE Inactive AS context, if stored;
 - 2> if the *RRCResume* does not include the *restoreSCG*:
 - 3> release the MR-DC related configurations (i.e., as specified in 5.3.5.10) from the UE Inactive AS context, if stored;
 - 2> restore the *masterCellGroup*, *mrdc-SecondaryCellGroup*, if stored, and *pdcp-Config* from the UE Inactive AS context;
 - 2> configure lower layers to consider the restored MCG and SCG SCell(s) (if any) to be in deactivated state;
- 1> discard the UE Inactive AS context;
- 1> store the used *nextHopChainingCount* value associated to the current K_{gNB} ;
- 1> if *sdt-MAC-PHY-CG-Config* is configured:
 - 2> instruct the MAC entity to stop the *cg-SDT-TimeAlignmentTimer*, if it is running;
 - 2> instruct the MAC entity to start the timeAlignmentTimer associated with the PTAG, if it is not running;
- 1> if srs-PosRRC-InactiveConfig is configured:
 - 2> instruct the MAC entity to stop *inactivePosSRS-TimeAlignmentTimer*, if it is running;
- 1> release the *suspendConfig* except the *ran-NotificationAreaInfo*;
- 1> if the *RRCResume* includes the *masterCellGroup*:
 - 2> perform the cell group configuration for the received masterCellGroup according to 5.3.5.5;
- 1> if the *RRCResume* includes the *mrdc-SecondaryCellGroup*:
 - 2> if the received *mrdc-SecondaryCellGroup* is set to *nr-SCG*:

- 3> perform the RRC reconfiguration according to 5.3.5.3 for the *RRCReconfiguration* message included in *nr-SCG*;
- 2> if the received *mrdc-SecondaryCellGroup* is set to *eutra-SCG*:
 - 3> perform the RRC connection reconfiguration as specified in TS 36.331 [10], clause 5.3.5.3 for the *RRCConnectionReconfiguration* message included in *eutra-SCG*;
- 1> if the *RRCResume* includes the *radioBearerConfig*:
 - 2> perform the radio bearer configuration according to 5.3.5.6;
- 1> if the *RRCResume* message includes the *sk-Counter*:
 - 2> perform security key update procedure as specified in 5.3.5.7;
- 1> if the *RRCResume* message includes the *radioBearerConfig2*:
 - 2> perform the radio bearer configuration according to 5.3.5.6;
- 1> if the RRCResume message includes the needForGapsConfigNR:
 - 2> if *needForGapsConfigNR* is set to *setup*:
 - 3> consider itself to be configured to provide the measurement gap requirement information of NR target bands;
 - 2> else:
 - 3> consider itself not to be configured to provide the measurement gap requirement information of NR target bands;
- 1> if the RRCResume message includes the needForGapNCSG-ConfigNR:
 - 2> if *needForGapNCSG-ConfigNR* is set to *setup*:
 - 3> consider itself to be configured to provide the measurement gap and NCSG requirement information of NR target bands;
 - 2> else:
 - 3> consider itself not to be configured to provide the measurement gap and NCSG requirement information of NR target bands;
- 1> if the *RRCResume* message includes the *needForGapNCSG-ConfigEUTRA*:
 - 2> if needForGapNCSG-ConfigEUTRA is set to setup:
 - 3> consider itself to be configured to provide the measurement gap and NCSG requirement information of E-UTRA target bands;
 - 2> else:
 - 3> consider itself not to be configured to provide the measurement gap and NCSG requirement information of E-UTRA target bands;
- 1> if the RRCResume message includes the appLayerMeasConfig:
 - 2> perform the application layer measurement configuration procedure as specified in 5.3.5.13d;
- 1> if the RRCResume message includes the sl-L2RemoteUE-Config (i.e. the UE is a L2 U2N Remote UE):
 - 2> perform the L2 U2N Remote UE configuration procedure as specified in 5.3.5.16;
- 1> if the *RRCResume* message includes the *sl-ConfigDedicatedNR*:
 - 2> perform the sidelink dedicated configuration procedure as specified in 5.3.5.14;

- 1> resume SRB2 (if suspended), SRB3 (if configured), SRB4 (if configured), all DRBs (that are suspended) and multicast MRBs;
- NOTE 1: If the SCG is deactivated, resuming SRB3 and all DRBs does not imply that PDCP or RRC PDUs can be transmitted or received on SCG RLC bearers.
- 1> if stored, discard the cell reselection priority information provided by the *cellReselectionPriorities* or inherited from another RAT;
- 1> stop timer T320, if running;
- 1> if the *RRCResume* message includes the *measConfig*:
 - 2> perform the measurement configuration procedure as specified in 5.5.2;
- 1> resume measurements if suspended;
- 1> if T390 is running:
 - 2> stop timer T390 for all access categories;
 - 2> perform the actions as specified in 5.3.14.4;
- 1> if T302 is running:
 - 2> stop timer T302;
 - 2> perform the actions as specified in 5.3.14.4;
- 1> enter RRC_CONNECTED;
- 1> indicate to upper layers that the suspended RRC connection has been resumed;
- 1> stop the cell re-selection procedure;
- 1> stop relay reselection procedure if any for L2 U2N Remote UE;
- 1> consider the current cell to be the PCell;
- 1> set the content of the of RRCResumeComplete message as follows:
 - 2> if the upper layer provides NAS PDU, set the *dedicatedNAS-Message* to include the information received from upper layers;
 - 2> if upper layers provides a PLMN:
 - 3> if the UE is either allowed or instructed to access the PLMN via a cell for which at least one CAG ID is broadcast:
 - 4> set the *selectedPLMN-Identity* from the *npn-IdentityInfoList*;
 - 3> else:
 - 4> set the selectedPLMN-Identity to the PLMN selected by upper layers from the plmn-IdentityInfoList;
 - 2> if the *masterCellGroup* contains the *reportUplinkTxDirectCurrent*:
 - 3> include the *uplinkTxDirectCurrentList* for each MCG serving cell with UL;
 - 3> include *uplinkDirectCurrentBWP-SUL* for each MCG serving cell configured with SUL carrier, if any, within the *uplinkTxDirectCurrentList*;
 - 2> if the *masterCellGroup* contains the *reportUplinkTxDirectCurrentTwoCarrier*:
 - 3> include in the *uplinkTxDirectCurrentTwoCarrierList* the list of uplink Tx DC locations for the configured uplink carrier aggregation in the MCG;
 - 2> if the *masterCellGroup* contains the *reportUplinkTxDirectCurrentMoreCarrier*:

- 3> include in the *uplinkTxDirectCurrentMoreCarrierList* the list of uplink Tx DC locations for the configured uplink carrier aggregation in the MCG;
- 2> if the UE has idle/inactive measurement information concerning cells other than the PCell available in *VarMeasIdleReport*:
 - 3> if the *idleModeMeasurementReq* is included in the *RRCResume* message:
 - 4> set the *measResultIdleEUTRA* in the *RRCResumeComplete* message to the value of *measReportIdleEUTRA* in the *VarMeasIdleReport*, if available;
 - 4> set the *measResultIdleNR* in the *RRCResumeComplete* message to the value of *measReportIdleNR* in the *VarMeasIdleReport*, if available;
 - 4> discard the *VarMeasIdleReport* upon successful delivery of the *RRCResumeComplete* message is confirmed by lower layers;

3> else:

- 4> if the SIB1 contains *idleModeMeasurementsNR* and the UE has NR idle/inactive measurement information concerning cells other than the PCell available in *VarMeasIdleReport*; or
- 4> if the SIB1 contains *idleModeMeasurementsEUTRA* and the UE has E-UTRA idle/inactive measurement information available in *VarMeasIdleReport*:
 - 5> include the *idleMeasAvailable*;
- 2> if the RRCResume message includes mrdc-SecondaryCellGroup set to eutra-SCG:
 - 3> include in the *eutra-SCG-Response* the E-UTRA *RRCConnectionReconfigurationComplete* message in accordance with TS 36.331 [10] clause 5.3.5.3;
- 2> if the RRCResume message includes mrdc-SecondaryCellGroup set to nr-SCG:
 - 3> include in the *nr-SCG-Response* the SCG *RRCReconfigurationComplete* message;
- 2> if the UE has logged measurements available for NR and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 3> include the *logMeasAvailable* in the *RRCResumeComplete* message;
 - 3> if Bluetooth measurement results are included in the logged measurements the UE has available for NR:
 - 4> include the *logMeasAvailableBT* in the *RRCResumeComplete* message;
 - 3> if WLAN measurement results are included in the logged measurements the UE has available for NR:
 - 4> include the *logMeasAvailableWLAN* in the *RRCResumeComplete* message;
- 2> if the *sigLoggedMeasType* in *VarLogMeasReport* is included:
 - 3> if T330 timer is running and the logged measurements configuration is for NR:
 - 4> set sigLogMeasConfigAvailable to true in the RRCResumeComplete message;
 - 3> else:
 - 4> if the UE has logged measurements available for NR:
 - 5> set sigLogMeasConfigAvailable to false in the RRCResumeComplete message;
- 2> if the UE has connection establishment failure or connection resume failure information available in VarConnEstFailReport or VarConnEstFailReportList and if the RPLMN is equal to plmn-Identity stored in VarConnEstFailReport or in at least one of the entries of VarConnEstFailReportList:
 - 3> include connEstFailInfoAvailable in the RRCResumeComplete message;

- 2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*; or
- 2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* of TS 36.331 [10] and if the UE is capable of cross-RAT RLF reporting and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report* of TS 36.331 [10]:
 - 3> include rlf-InfoAvailable in the RRCResumeComplete message;
- 2> if the UE has successful handover information available in *VarSuccessHO-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessHO-Report*:
 - 3> include successHO-InfoAvailable in the RRCResumeComplete message;
- 2> if the UE supports storage of mobility history information and the UE has mobility history information available in *VarMobilityHistoryReport*:
 - 3> include the *mobilityHistoryAvail* in the *RRCResumeComplete* message;
- 2> if *speedStateReselectionPars* is configured in the *SIB2*:
 - 3> include the *mobilityState* in the *RRCResumeComplete* message and set it to the mobility state (as specified in TS 38.304 [20]) of the UE just prior to entering RRC_CONNECTED state;
- 2> if the UE is configured to provide the measurement gap requirement information of NR target bands:
 - 3> include the *NeedForGapsInfoNR* and set the contents as follows:
 - 4> include *intraFreq-needForGap* and set the gap requirement information of intra-frequency measurement for each NR serving cell;
 - 4> if requestedTargetBandFilterNR is configured, for each supported NR band that is also included in requestedTargetBandFilterNR, include an entry in interFreq-needForGap and set the gap requirement information for that band; otherwise, include an entry in interFreq-needForGap and set the corresponding gap requirement information for each supported NR band;
- 2> if the UE is configured to provide the measurement gap and NCSG requirement information of NR target bands:
 - 3> include the *NeedForGapNCSG-InfoNR* and set the contents as follows:
 - 4> include *intraFreq-needForNCSG* and set the gap and NCSG requirement information of intrafrequency measurement for each NR serving cell;
 - 4> if requestedTargetBandFilterNCSG-NR is configured:
 - 5> for each supported NR band included in *requestedTargetBandFilterNCSG-NR*, include an entry in *interFreq-needForNCSG* and set the NCSG requirement information for that band;
 - 4> else:
 - 5> include an entry for each supported NR band in *interFreq-needForNCSG* and set the corresponding NCSG requirement information;
- 2> if the UE is configured to provide the measurement gap and NCSG requirement information of E-UTRA target bands:
 - 3> include the NeedForGapNCSG-InfoEUTRA and set the contents as follows:
 - 4> if requestedTargetBandFilterNCSG-EUTRA is configured:
 - 5> for each supported E-UTRA band included in *requestedTargetBandFilterNCSG-EUTRA*, include an entry in *needForNCSG-EUTRA* and set the NCSG requirement information for that band;
 - 4> else:

- 5> include an entry for each supported E-UTRA band in *needForNCSG-EUTRA* and set the corresponding NCSG requirement information;
- 1> submit the RRCResumeComplete message to lower layers for transmission;
- 1> the procedure ends.
- NOTE 2: Network only configures at most one of reportUplinkTxDirectCurrent, reportUplinkTxDirectCurrentTwoCarrier or reportUplinkTxDirectCurrentMoreCarrier in one RRC message.

5.3.13.5 Handling of failure to resume RRC Connection

- 1> if timer T319 expires:
 - 2> if the UE supports multiple CEF report:
 - 3> if the UE has connection establishment failure information or connection resume failure information available in VarConnEstFailReport and if the RPLMN is equal to plmn-identity stored in VarConnEstFailReport; and
 - 3> if the cell identity of current cell is not equal to the cell identity stored in *measResultFailedCell* in *VarConnEstFailReport* and if the *maxCEFReport-r17* has not been reached:
 - 4> append the VarConnEstFailReport as a new entry in the VarConnEstFailReportList;
 - 2> if the UE has connection establishment failure information or connection resume failure information available in VarConnEstFailReport and if the RPLMN is not equal to plmn-identity stored in VarConnEstFailReport; or
 - 2> if the cell identity of current cell is not equal to the cell identity stored in *measResultFailedCell* in *VarConnEstFailReport*:
 - 3> reset the *numberOfConnFail* to 0;
 - 2> if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReportList* and if the RPLMN is not equal to *plmn-identity* stored in any entry of *VarConnEstFailReportList*:
 - 3> clear the content included in VarConnEstFailReportList;
 - 2> clear the content included in VarConnEstFailReport except for the numberOfConnFail, if any;
 - 2> store the following connection resume failure information in the *VarConnEstFailReport* by setting its fields as follows:
 - 3> set the *plmn-Identity* to the PLMN selected by upper layers (see TS 24.501 [23]) from the PLMN(s) included in the *plmn-IdentityInfoList* in *SIB1*;
 - 3> set the *measResultFailedCell* to include the global cell identity, tracking area code, the cell level and SS/PBCH block level RSRP, and RSRQ, and SS/PBCH block indexes, of the failed cell based on the available SSB measurements collected up to the moment the UE detected connection resume failure;
 - 3> if available, set the *measResultNeighCells*, in order of decreasing ranking-criterion as used for cell reselection, to include neighbouring cell measurements for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency as well as 3 inter-RAT neighbours, per frequency/ set of frequencies per RAT and according to the following:
 - 4> for each neighbour cell included, include the optional fields that are available;
- NOTE: The UE includes the latest results of the available measurements as used for cell reselection evaluation, which are performed in accordance with the performance requirements as specified in TS 38.133 [14].
 - 3> if available, set the *locationInfo* as in 5.3.3.7;

- 3> set *perRAInfoList* to indicate the performed random access procedure related information as specified in 5.7.10.5;
- 3> if numberOfConnFail is smaller than 8:
 - 4> increment the *numberOfConnFail* by 1;
- 2> perform the actions upon going to RRC_IDLE as specified in 5.3.11 with release cause 'RRC Resume failure'.
- 1> else if upon receiving integrity check failure indication from lower layers while T319 is running:
 - 2> perform the actions upon going to RRC_IDLE as specified in 5.3.11 with release cause 'RRC Resume failure'.
- 1> else if indication from the MCG RLC that the maximum number of retransmissions has been reached is received while SDT procedure is ongoing; or
- 1> if random access problem indication is received from MCG MAC while SDT procedure is ongoing; or
- 1> if the lower layers indicate that *cg-SDT-TimeAlignmentTimer* or the *configuredGrantTimer* expired before receiving network response for the UL CG-SDT transmission with CCCH message while SDT procedure is ongoing; or
- 1> if integrity check failure indication is received from lower layers while SDT procedure is ongoing; or
- 1> if T319a expires:
 - 2> consider SDT procedure is not ongoing;
 - 2> perform the actions upon going to RRC_IDLE as specified in 5.3.11 with release cause 'RRC Resume failure'.

The UE may discard the connection resume failure or connection establishment failure information, i.e. release the UE variable *VarConnEstFailReport* and the UE variable *VarConnEstFailReportList*, 48 hours after the last connection resume failure is detected.

The L2 U2N Relay UE either indicates to upper layers (to trigger PC5 unicast link release) or sends Notification message to the connected L2 U2N Remote UE(s) in accordance with 5.8.9.10.

5.3.13.6 Cell re-selection or cell selection or L2 U2N relay (re)selection while T390, T319 or T302 is running or SDT procedure is ongoing (UE in RRC_INACTIVE) or SRS transmission in RRC_INACTIVE is configured

- 1> if cell reselection occurs while T319 or T302 is running or while SDT procedure is ongoing; or
- 1> if relay reselection occurs while T319 is running; or
- 1> if cell changes due to relay reselection while T302 is running:
 - 2> perform the actions upon going to RRC_IDLE as specified in 5.3.11 with release cause 'RRC Resume failure':
- 1> else if cell selection or reselection occurs while T390 is running, or cell change due to relay selection or reselection occurs while T390 is running:
 - 2> stop T390 for all access categories;
 - 2> perform the actions as specified in 5.3.14.4.
- 1> else if cell reselection occurs when *srs-PosRRC-Inactive* is configured:
 - 2> indicate to the lower layer to stop *inactivePosSRS-TimeAlignmentTimer*;

2> release the *srs-PosRRC-Inactive*.

5.3.13.7 Reception of the *RRCSetup* by the UE

The UE shall:

1> perform the RRC connection setup procedure as specified in 5.3.3.4.

5.3.13.8 RNA update

In RRC_INACTIVE state, the UE shall:

- 1> if T380 expires; or
- 1> if RNA Update is triggered at reception of SIB1, as specified in 5.2.2.4.2:
 - 2> if T319 is not running or SDT procedure is not ongoing:
 - 3> initiate RRC connection resume procedure in 5.3.13.2 with resumeCause set to rna-Update;
- 1> if barring is alleviated for Access Category '8' or Access Category '2', as specified in 5.3.14.4:
 - 2> if upper layers do not request RRC the resumption of an RRC connection, and
 - 2> if the variable *pendingRNA-Update* is set to *true*:
 - 3> initiate RRC connection resume procedure in 5.3.13.2 with resumeCause value set to rna-Update.

If the UE in RRC_INACTIVE state fails to find a suitable cell and camps on the acceptable cell to obtain limited service as defined in TS 38.304 [20], the UE shall:

1> perform the actions upon going to RRC_IDLE as specified in 5.3.11 with release cause 'other'.

NOTE: It is left to UE implementation how to behave when T380 expires while the UE is camped neither on a suitable nor on an acceptable cell.

5.3.13.9 Reception of the *RRCRelease* by the UE

The UE shall:

1> perform the actions as specified in 5.3.8.

5.3.13.10 Reception of the *RRCReject* by the UE

The UE shall:

1> perform the actions as specified in 5.3.15.

5.3.13.11 Inability to comply with *RRCResume*

- 1> if the UE is unable to comply with (part of) the configuration included in the RRCResume message;
 - 2> perform the actions upon going to RRC_IDLE as specified in 5.3.11 with release cause 'RRC Resume failure'.
- NOTE 1: The UE may apply above failure handling also in case the *RRCResume* message causes a protocol error for which the generic error handling as defined in 10 specifies that the UE shall ignore the message.
- NOTE 2: If the UE is unable to comply with part of the configuration, it does not apply any part of the configuration, i.e. there is no partial success/failure.

5.3.13.12 Inter RAT cell reselection

Upon reselecting to an inter-RAT cell, the UE shall:

1> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'other'.

5.3.14 Unified Access Control

5.3.14.1 General

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer. This procedure does not apply to IAB-MT. This procedure does not apply to L2 U2N Relay UE initiating RRC connection establishment or RRC connection resume upon reception of any message from a L2 U2N remote UE via SL-RLC0 or SL-RLC1 in accordance to 5.3.3.1a or 5.3.13.1a.

After a PCell change in RRC_CONNECTED the UE shall defer access barring checks until it has obtained *SIB1* (as specified in 5.2.2.2) from the target cell.

5.3.14.2 Initiation

Upon initiation of the procedure, the UE shall:

- 1> if timer T390 is running for the Access Category:
 - 2> consider the access attempt as barred;
- 1> else if timer T302 is running and the Access Category is neither '2' nor '0':
 - 2> consider the access attempt as barred;
- 1> else:
 - 2> if the Access Category is '0':
 - 3> consider the access attempt as allowed;
 - 2> else:
 - 3> if *SIB1* includes *uac-BarringPerPLMN-List* that contains a *UAC-BarringPerPLMN* for the selected PLMN or SNPN:
 - 4> if the procedure in 5.2.2.4.2 for a selected PLMN resulted in use of information in *npn-IdentityInfoList* and *UAC-BarringPerPLMN* has an entry with the *plmn-IdentityIndex* corresponding to used information in this list:
 - 5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to used information in the *npn-IdentityInfoList*;
 - 4> else:
 - 5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the selected PLMN and the *PLMN-IdentityInfo*, *if any*, or the selected SNPN and the *npn-IdentityInfoList*;
 - 3> if any *UAC-BarringPerPLMN* entry is selected:
 - 4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;
 - 3> else if SIB1 includes *uac-BarringForCommon*:
 - 4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

- 3> else:
 - 4> consider the access attempt as allowed;
- 3> if uac-BarringForCommon is applicable or the uac-ACBarringListType indicates that uac-ExplicitACBarringList is used:
 - 4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:
 - 5> select the *UAC-BarringPerCat* entry;
 - 5> if the *uac-BarringInfoSetList* contains a *UAC-BarringInfoSet* entry corresponding to the selected *uac-barringInfoSetIndex* in the *UAC-BarringPerCat*:
 - 6> select the *UAC-BarringInfoSet* entry;
 - 6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";
 - 5> else:
 - 6> consider the access attempt as allowed;
 - 4> else:
 - 5> consider the access attempt as allowed;
- 3> else if the *uac-ACBarringListType* indicates that *uac-ImplicitACBarringList* is used:
 - 4> select the uac-BarringInfoSetIndex corresponding to the Access Category in the uac-ImplicitACBarringList;
 - 4> if the *uac-BarringInfoSetList* contains the *UAC-BarringInfoSet* entry corresponding to the selected *uac-BarringInfoSetIndex*:
 - 5> select the *UAC-BarringInfoSet* entry;
 - 5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";
 - 4> else:
 - 5> consider the access attempt as allowed;
- 3> else:
 - 4> consider the access attempt as allowed;
- 1> if the access barring check was requested by upper layers:
 - 2> if the access attempt is considered as barred:
 - 3> if timer T302 is running:
 - 4> if timer T390 is running for Access Category '2':
 - 5> inform the upper layer that access barring is applicable for all access categories except categories '0', upon which the procedure ends;
 - 4> else
 - 5> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;
 - 3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends:

1> else:

2> the procedure ends.

5.3.14.3 Void

5.3.14.4 T302, T390 expiry or stop (Barring alleviation)

The UE shall:

- 1> if timer T302 expires or is stopped:
 - 2> for each Access Category for which T390 is not running:
 - 3> consider the barring for this Access Category to be alleviated:
- 1> else if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running:
 - 2> consider the barring for this Access Category to be alleviated;
- 1> else if timer T390 corresponding to the Access Category '2' expires or is stopped:
 - 2> consider the barring for this Access Category to be alleviated;
- 1> when barring for an Access Category is considered being alleviated:
 - 2> if the Access Category was informed to upper layers as barred:
 - 3> inform upper layers about barring alleviation for the Access Category.
 - 2> if barring is alleviated for Access Category '8'; or
 - 2> if barring is alleviated for Access Category '2':
 - 3> perform actions specified in 5.3.13.8;

5.3.14.5 Access barring check

The UE shall:

- 1> if one or more Access Identities equal to 1, 2, 11, 12, 13, 14, or 15 are indicated according to TS 24.501 [23], and
- 1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:
 - 2> consider the access attempt as allowed;

1> else:

- 2> if the establishment of the RRC connection is the result of release with redirect with *mpsPriorityIndication* (either in NR or E-UTRAN); and
- 2> if the bit corresponding to Access Identity 1 in the *uac-BarringForAccessIdentity* contained in the "UAC barring parameter" is set to *zero*:
 - 3> consider the access attempt as allowed;

- 2> else if Access Identity 3 is indicated:
 - 3> draw a random number 'rand' uniformly distributed in the range: $0 \le \text{rand} < 1$;
 - 3> if 'rand' is lower than the value indicated by uac-BarringFactorForAI3 included in "UAC barring parameter":
 - 4> consider the access attempt as allowed;
 - 3> else:
 - 4> consider the access attempt as barred;
- 2> else:
 - 3> draw a random number 'rand' uniformly distributed in the range: $0 \le rand < 1$;
 - 3> if 'rand' is lower than the value indicated by uac-BarringFactor included in "UAC barring parameter":
 - 4> consider the access attempt as allowed;
 - 3> else:
 - 4> consider the access attempt as barred;
- 1> if the access attempt is considered as barred:
 - 2> draw a random number 'rand' that is uniformly distributed in the range $0 \le rand < 1$;
 - 2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in "UAC barring parameter":

T390 = (0.7 + 0.6 * rand) * uac-BarringTime.

5.3.15 RRC connection reject

5.3.15.1 Initiation

The UE initiates the procedure upon the reception of *RRCReject* when the UE tries to establish or resume an RRC connection.

5.3.15.2 Reception of the *RRCReject* by the UE

- 1> stop timer T300, if running;
- 1> stop timer T319, if running;
- 1> stop timer T319a, if running and consider SDT procedure is not ongoing;
- 1> stop timer T302, if running;
- 1> reset MAC and release the default MAC Cell Group configuration;
- 1> if waitTime is configured in the RRCReject:
 - 2> start timer T302, with the timer value set to the waitTime;
- 1> if *RRCReject* is received in response to a request from upper layers:
 - 2> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2';
- 1> if RRCReject is received in response to an RRCSetupRequest:
 - 2> inform upper layers about the failure to setup the RRC connection, upon which the procedure ends;

- 1> else if RRCReject is received in response to an RRCResumeRequest or an RRCResumeRequest1:
 - 2> if resume is triggered by upper layers:
 - 3> inform upper layers about the failure to resume the RRC connection;
 - 2> if resume is triggered due to an RNA update; or
 - 2> if resume is triggered for SDT and T380 has expired:
 - 3> set the variable *pendingRNA-Update* to *true*;
 - 2> discard the current K_{gNB} key, the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key derived in accordance with 5.3.13.3;
 - 2> if resume is triggered for SDT:
 - 3> for SRB2, if it is resumed and for SRB1:
 - 4> trigger the PDCP entity to perform SDU discard as specified in TS 38.323 [5];
 - 4> re-establish the RLC entity as specified in TS 38.322 [4];
 - 3> for each DRB that is not suspended:
 - 4> indicate PDCP suspend to lower layers;
 - 4> re-establish the RLC entity as specified in TS 38.322 [4];
 - 2> suspend SRB1 and the radio bearers configured for SDT, if any;
 - 2> the procedure ends.

Upon L2 U2N Relay UE receives *RRCReject*, it either indicates to upper layers (to trigger PC5 unicast link release) or sends Notification message to the connected L2 U2N Remote UE(s) in accordance with 5.8.9.10.

The RRC_INACTIVE UE shall continue to monitor paging while the timer T302 is running.

NOTE: If timer T331 is running, the UE continues to perform idle/inactive measurements according to 5.7.8.

5.4 Inter-RAT mobility

5.4.1 Introduction

Network controlled inter-RAT mobility between NR and E-UTRA, where E-UTRA can be connected to either EPC or 5GC, and from NR to UTRA-FDD is supported.

5.4.2 Handover to NR

5.4.2.1 General

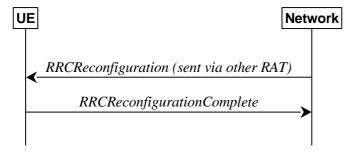


Figure 5.4.2.1-1: Handover to NR, successful

The purpose of this procedure is to, under the control of the network, transfer a connection between the UE and another Radio Access Network (e.g. E-UTRAN) to NR.

The handover to NR procedure applies when SRBs, possibly in combination with DRBs, are established in another RAT. Handover from E-UTRA to NR applies only after integrity has been activated in E-UTRA.

5.4.2.2 Initiation

The RAN using another RAT initiates the handover to NR procedure, in accordance with the specifications applicable for the other RAT, by sending the *RRCReconfiguration* message via the radio access technology from which the inter-RAT handover is performed.

The network applies the procedure as follows:

- to activate ciphering, possibly using NULL algorithm, if not yet activated in the other RAT;
- to re-establish SRBs and one or more DRBs;

5.4.2.3 Reception of the RRCReconfiguration by the UE

The UE shall:

- 1> apply the default L1 parameter values as specified in corresponding physical layer specifications except for the parameters for which values are provided in *SIB1*;
- 1> apply the default MAC Cell Group configuration as specified in 9.2.2;
- 1> perform RRC reconfiguration procedure as specified in 5.3.5;

NOTE: If the UE is connected to 5GC of the source E-UTRA cell, the delta configuration for PDCP and SDAP can be used for intra-system inter-RAT handover. For other cases, source RAT configuration is not considered when the UE applies the reconfiguration message of target RAT.

5.4.3 Mobility from NR

5.4.3.1 General

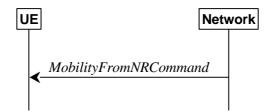


Figure 5.4.3.1-1: Mobility from NR, successful

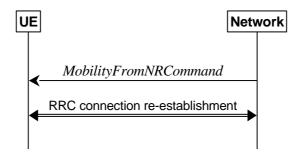


Figure 5.4.3.1-2: Mobility from NR, failure

The purpose of this procedure is to move a UE in RRC_CONNECTED to a cell using other RAT, e.g. E-UTRA, UTRA-FDD. The mobility from NR procedure covers the following type of mobility:

- handover, i.e. the *MobilityFromNRCommand* message includes radio resources that have been allocated for the UE in the target cell;

5.4.3.2 Initiation

The network initiates the mobility from NR procedure to a UE in RRC_CONNECTED, possibly in response to a *MeasurementReport* or an *MCGFailureInformation* message, by sending a *MobilityFromNRCommand* message. The network applies the procedure as follows:

- the procedure is initiated only when AS security has been activated, and SRB2 with at least one DRB or multicast MRB are setup and not suspended;
- the procedure is not initiated if any DAPS bearer is configured;

5.4.3.3 Reception of the *MobilityFromNRCommand* by the UE

The UE shall:

- 1> stop timer T310, if running;
- 1> stop timer T312, if running;
- 1> if T316 is running:
 - 2> stop timer T316;
 - 2> clear the information included in VarRLF-Report, if any;
- 1> if T390 is running:
 - 2> stop timer T390 for all access categories;
 - 2> perform the actions as specified in 5.3.14.4;
- 1> if the *targetRAT-Type* is set to *eutra*:
 - 2> consider inter-RAT mobility as initiated towards E-UTRA;
 - 2> forward the *nas-SecurityParamFromNR* to the upper layers, if included;
- 1> else if the *targetRAT-Type* is set to *utra-fdd*:
 - 2> consider inter-RAT mobility as initiated towards UTRA-FDD;
 - 2> forward the nas-SecurityParamFromNR to the upper layers, if included;
- 1> access the target cell indicated in the inter-RAT message in accordance with the specifications of the target RAT.

5.4.3.4 Successful completion of the mobility from NR

Upon successfully completing the handover, at the source side the UE shall:

- 1> reset MAC;
- 1> stop all timers that are running except T325, T330 and T400;
- 1> release ran-NotificationAreaInfo, if stored;
- 1> release the AS security context including the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key, if stored;
- 1> release all radio resources, including release of the RLC entity and the MAC configuration;
- 1> release the associated PDCP entity and SDAP entity for all established RBs;

- NOTE: PDCP and SDAP configured by the source RAT prior to the handover that are reconfigured and re-used by target RAT when delta signalling (i.e., during inter-RAT intra-system handover when *fullConfig* is not present) is used, are not released as part of this procedure.
- 1> if the targetRAT-Type is set to eutra and the nas-SecurityParamFromNR is included: or
- 1> if the targetRAT-Type is set to utra-fdd:
 - 2> indicate the release of the RRC connection to upper layers together with the release cause 'other'.

5.4.3.5 Mobility from NR failure

- 1> if the UE does not succeed in establishing the connection to the target radio access technology:
 - 2> if the targetRAT-Type in the received MobilityFromNRCommand is set to eutra and the UE supports Radio Link Failure Report for Inter-RAT MRO EUTRA:
 - 3> store handover failure information in *VarRLF-Report* according to 5.3.10.5;
 - 2> if voiceFallbackIndication is included in the MobilityFromNRCommand message; or
 - 2> if the mobility from NR procedure is for emergency services fallback as specified in TS 23.502 [43]:
 - 3> attempt to select an E-UTRA cell:
 - 4> if a suitable E-UTRA cell is selected; or
 - 4> if no suitable E-UTRA cell is available and an acceptable E-UTRA cell supporting emergency call is selected when the UE has an ongoing emergency call:
 - 5> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'RRC connection failure';
 - 4> else:
 - 5> revert back to the configuration used in the source PCell;
 - 5> initiate the connection re-establishment procedure as specified in clause 5.3.7;
- NOTE: It is left to UE implementation to determine whether the mobility from NR procedure is for emergency services fallback as specified in TS 23.502 [43].
 - 2> else:
 - 3> revert back to the configuration used in the source PCell;
 - 3> initiate the connection re-establishment procedure as specified in clause 5.3.7;
- 1> else if the UE is unable to comply with any part of the configuration included in the *MobilityFromNRCommand* message; or
- 1> if there is a protocol error in the inter RAT information included in the *MobilityFromNRCommand* message, causing the UE to fail the procedure according to the specifications applicable for the target RAT:
 - 2> if the *targetRAT-Type* in the received *MobilityFromNRCommand* is set to *eutra* and the UE supports Radio Link Failure Report for Inter-RAT MRO EUTRA:
 - 3> store handover failure information in *VarRLF-Report* according to 5.3.10.5;
 - 2> revert back to the configuration used in the source PCell;
 - 2> initiate the connection re-establishment procedure as specified in clause 5.3.7.

5.5 Measurements

5.5.1 Introduction

The network may configure an RRC_CONNECTED UE to perform measurements. The network may configure the UE to report them in accordance with the measurement configuration or perform conditional reconfiguration evaluation in accordance with the conditional reconfiguration. The measurement configuration is provided by means of dedicated signalling i.e. using the *RRCReconfiguration* or *RRCResume*.

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The network may configure the UE to perform the following types of measurements:

- NR measurements;
- Inter-RAT measurements of E-UTRA frequencies;
- Inter-RAT measurements of UTRA-FDD frequencies;
- NR sidelink measurements of L2 U2N Relay UEs.

The network may configure the UE to report the following measurement information based on SS/PBCH block(s):

- Measurement results per SS/PBCH block;
- Measurement results per cell based on SS/PBCH block(s);
- SS/PBCH block(s) indexes.

The network may configure the UE to report the following measurement information based on CSI-RS resources:

- Measurement results per CSI-RS resource;
- Measurement results per cell based on CSI-RS resource(s);
- CSI-RS resource measurement identifiers.

The network may configure the UE to perform the following types of measurements for NR sidelink and V2X sidelink:

- CBR measurements.

The network may configure the UE to report the following CLI measurement information based on SRS resources:

- Measurement results per SRS resource;
- SRS resource(s) indexes.

The network may configure the UE to report the following CLI measurement information based on CLI-RSSI resources:

- Measurement results per CLI-RSSI resource;
- CLI-RSSI resource(s) indexes.

The network may configure the UE to report the following Rx-Tx time difference measurement information based on CSI-RS for tracking or PRS:

- UE Rx-Tx time difference measurement result.

The measurement configuration includes the following parameters:

- 1. Measurement objects: A list of objects on which the UE shall perform the measurements.
 - For intra-frequency and inter-frequency measurements a measurement object indicates the frequency/time location and subcarrier spacing of reference signals to be measured. Associated with this measurement object, the network may configure a list of cell specific offsets, a list of 'exclude-listed' cells and a list of 'allow-listed' cells. Exclude-listed cells are not applicable in event evaluation or measurement reporting. Allow-listed cells are the only ones applicable in event evaluation or measurement reporting.

- The *measObjectId* of the MO which corresponds to each serving cell is indicated by *servingCellMO* within the serving cell configuration.
- For inter-RAT E-UTRA measurements a measurement object is a single E-UTRA carrier frequency. Associated with this E-UTRA carrier frequency, the network can configure a list of cell specific offsets and a list of 'exclude-listed' cells. Exclude-listed cells are not applicable in event evaluation or measurement reporting.
- For inter-RAT UTRA-FDD measurements a measurement object is a set of cells on a single UTRA-FDD carrier frequency.
- For NR sidelink measurements of L2 U2N Relay UEs, a measurement object is a single NR sidelink frequency to be measured.
- For CBR measurement of NR sidelink communication, a measurement object is a set of transmission resource pool(s) on a single carrier frequency for NR sidelink communication.
- For CBR measurement of NR sidelink discovery, a measurement object is a set of discovery dedicated resource pool(s) or transmission resource pool(s) also used for NR sidelink discovery on a single carrier frequency for NR sidelink discovery.
- For CLI measurements a measurement object indicates the frequency/time location of SRS resources and/or CLI-RSSI resources, and subcarrier spacing of SRS resources to be measured.
- **2. Reporting configurations:** A list of reporting configurations where there can be one or multiple reporting configurations per measurement object. Each measurement reporting configuration consists of the following:
 - Reporting criterion: The criterion that triggers the UE to send a measurement report. This can either be periodical or a single event description.
 - RS type: The RS that the UE uses for beam and cell measurement results (SS/PBCH block or CSI-RS).
 - Reporting format: The quantities per cell and per beam that the UE includes in the measurement report (e.g. RSRP) and other associated information such as the maximum number of cells and the maximum number beams per cell to report.

In case of conditional reconfiguration, each configuration consists of the following:

- Execution criteria: The criteria the UE uses for conditional reconfiguration execution.
- RS type: The RS that the UE uses for obtaining beam and cell measurement results (SS/PBCH block-based or CSI-RS-based), used for evaluating conditional reconfiguration execution condition.
- 3. Measurement identities: For measurement reporting, a list of measurement identities where each measurement identity links one measurement object with one reporting configuration. By configuring multiple measurement identities, it is possible to link more than one measurement object to the same reporting configuration, as well as to link more than one reporting configuration to the same measurement object. The measurement identity is also included in the measurement report that triggered the reporting, serving as a reference to the network. For conditional reconfiguration triggering, one measurement identity links to exactly one conditional reconfiguration trigger configuration. And up to 2 measurement identities can be linked to one conditional reconfiguration execution condition.
- **4. Quantity configurations:** The quantity configuration defines the measurement filtering configuration used for all event evaluation and related reporting, and for periodical reporting of that measurement. For NR measurements, the network may configure up to 2 quantity configurations with a reference in the NR measurement object to the configuration that is to be used. In each configuration, different filter coefficients can be configured for different measurement quantities, for different RS types, and for measurements per cell and per beam.
- **5. Measurement gaps:** Periods that the UE may use to perform measurements.

A UE in RRC_CONNECTED maintains a measurement object list, a reporting configuration list, and a measurement identities list according to signalling and procedures in this specification. The measurement object list possibly includes NR measurement object(s), CLI measurement object(s), inter-RAT objects, and L2 U2N Relay objects. Similarly, the reporting configuration list includes NR, inter-RAT, and L2 U2N Relay reporting configurations. Any measurement

object can be linked to any reporting configuration of the same RAT type. Some reporting configurations may not be linked to a measurement object. Likewise, some measurement objects may not be linked to a reporting configuration.

The measurement procedures distinguish the following types of cells:

- 1. The NR serving cell(s) these are the SpCell and one or more SCells.
- 2. Listed cells these are cells listed within the measurement object(s).
- 3. Detected cells these are cells that are not listed within the measurement object(s) but are detected by the UE on the SSB frequency(ies) and subcarrier spacing(s) indicated by the measurement object(s).

For NR measurement object(s), the UE measures and reports on the serving cell(s)/serving Relay UE (for L2 U2N Remote UE), listed cells and/or detected cells. For inter-RAT measurements object(s) of E-UTRA, the UE measures and reports on listed cells and detected cells and, for RSSI and channel occupancy measurements, the UE measures and reports on the configured resources on the indicated frequency. For inter-RAT measurements object(s) of UTRA-FDD, the UE measures and reports on listed cells. For CLI measurement object(s), the UE measures and reports on configured measurement resources (i.e. SRS resources and/or CLI-RSSI resources). For L2 U2N Relay object(s), the UE measures and reports on the serving NR cell(s), as well as the discovered L2 U2N Relay UEs.

Whenever the procedural specification, other than contained in clause 5.5.2, refers to a field it concerns a field included in the *VarMeasConfig* unless explicitly stated otherwise i.e. only the measurement configuration procedure covers the direct UE action related to the received *measConfig*.

In NR-DC, the UE may receive two independent *measConfig*:

- a measConfig, associated with MCG, that is included in the RRCReconfiguration message received via SRB1; and
- a *measConfig*, associated with SCG, that is included in the *RRCReconfiguration* message received via SRB3, or, alternatively, included within a *RRCReconfiguration* message embedded in a *RRCReconfiguration* message received via SRB1.

In this case, the UE maintains two independent *VarMeasConfig* and *VarMeasReportList*, one associated with each *measConfig*, and independently performs all the procedures in clause 5.5 for each *measConfig* and the associated *VarMeasConfig* and *VarMeasReportList*, unless explicitly stated otherwise.

The configurations related to CBR measurements are only included in the measConfig associated with MCG.

The configurations related to Rx-Tx time difference measurement are only included in the *measConfig* associated with MCG.

5.5.2 Measurement configuration

5.5.2.1 General

The network applies the procedure as follows:

- to ensure that, whenever the UE has a *measConfig* associated with a CG, it includes a *measObject* for the SpCell and for each NR SCell of the CG to be measured;
- to configure at most one measurement identity across all CGs using a reporting configuration with the *reportType* set to *reportCGI*;
- to configure at most one measurement identity per the node hosting PDCP entity using a reporting configuration with the *ul-DelayValueConfig*;
- to configure at most one measurement identity per the node hosting PDCP entity using a reporting configuration with the *ul-ExcessDelayConfig*;
- to ensure that, in the *measConfig* associated with a CG:
 - for all SSB based measurements there is at most one measurement object with the same *ssbFrequency*;

- an *smtc1* included in any measurement object with the same *ssbFrequency* has the same value and that an *smtc2* included in any measurement object with the same *ssbFrequency* has the same value and that an *smtc3list* included in any measurement object with the same *ssbFrequency* has the same value and that an *smtc4list* included in any measurement object with the same *ssbFrequency* has the same value;
- to ensure that all measurement objects configured in this specification and in TS 36.331 [10] with the same *ssbFrequency* have the same *ssbSubcarrierSpacing*;
- to ensure that, if a measurement object associated with the MCG has the same *ssbFrequency* as a measurement object associated with the SCG:
 - for that *ssbFrequency*, the measurement window according to the *smtc1* configured by the MCG includes the measurement window according to the *smtc1* configured by the SCG, or vice-versa, with an accuracy of the maximum receive timing difference specified in TS 38.133 [14].
 - if both measurement objects are used for RSSI measurements, bits in *measurementSlots* in both objects corresponding to the same slot are set to the same value. Also, the *endSymbol* is the same in both objects.
- to ensure that, if a measurement object has the same *ssbFrequency* as a measurement object configured in TS 36.331 [10]:
 - for that *ssbFrequency*, the measurement window according to the *smtc* configured in TS 36.331 [10] includes the measurement window according to the *smtc1* configured in TS 38.331, or vice-versa, with an accuracy of the maximum receive timing difference specified in TS 38.133 [14].
 - if both measurement objects are used for RSSI measurements, bits in *measurementSlots* in both objects corresponding to the same slot are set to the same value. Also, the *endSymbol* is the same in both objects.
- when the UE is in NE-DC, NR-DC, or NR standalone, to configure at most one measurement identity across all CGs using a reporting configuration with the *reportType* set to *reportSFTD*;

For CSI-RS resources, the network applies the procedure as follows:

- to ensure that all CSI-RS resources configured in each measurement object have the same center frequency, (startPRB+floor(nrofPRBs/2))
- to ensure that the total number of CSI-RS resources configured in each measurement object does not exceed the maximum number specified in TS 38.214 [19].

- 1> if the received *measConfig* includes the *measObjectToRemoveList*:
 - 2> perform the measurement object removal procedure as specified in 5.5.2.4;
- 1> if the received *measConfig* includes the *measObjectToAddModList*:
 - 2> perform the measurement object addition/modification procedure as specified in 5.5.2.5;
- 1> if the received *measConfig* includes the *reportConfigToRemoveList*:
 - 2> perform the reporting configuration removal procedure as specified in 5.5.2.6;
- 1> if the received measConfig includes the reportConfigToAddModList:
 - 2> perform the reporting configuration addition/modification procedure as specified in 5.5.2.7;
- 1> if the received *measConfig* includes the *quantityConfig*:
 - 2> perform the quantity configuration procedure as specified in 5.5.2.8;
- 1> if the received measConfig includes the measIdToRemoveList:
 - 2> perform the measurement identity removal procedure as specified in 5.5.2.2;
- 1> if the received *measConfig* includes the *measIdToAddModList*:

- 2> perform the measurement identity addition/modification procedure as specified in 5.5.2.3;
- 1> if the received *measConfig* includes the *measGapConfig*:
 - 2> perform the measurement gap configuration procedure as specified in 5.5.2.9;
- 1> if the received *measConfig* includes the *measGapSharingConfig*:
 - 2> perform the measurement gap sharing configuration procedure as specified in 5.5.2.11;
- 1> if the received *measConfig* includes the *s-MeasureConfig*:
 - 2> if *s-MeasureConfig* is set to *ssb-RSRP*, set parameter *ssb-RSRP* of *s-MeasureConfig* within *VarMeasConfig* to the threshold value of the RSRP indicated by the received value of *s-MeasureConfig* which is derived as specified in 6.3.2;
 - 2> else, set parameter *csi-RSRP* of *s-MeasureConfig* within *VarMeasConfig* to the threshold value of the RSRP indicated by the received value of *s-MeasureConfig* which is derived as specified in 6.3.2.

5.5.2.2 Measurement identity removal

The UE shall:

- 1> for each *measId* included in the received *measIdToRemoveList* that is part of the current UE configuration in *VarMeasConfig*:
 - 2> remove the entry with the matching measId from the measIdList within the VarMeasConfig;
 - 2> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 2> stop the periodical reporting timer or timer T321 or timer T322, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*.

NOTE: The UE does not consider the message as erroneous if the *measIdToRemoveList* includes any *measId* value that is not part of the current UE configuration.

5.5.2.3 Measurement identity addition/modification

The network applies the procedure as follows:

- configure a *measId* only if the corresponding measurement object, the corresponding reporting configuration and the corresponding quantity configuration, are configured.

- 1> for each measId included in the received measIdToAddModList:
 - 2> if an entry with the matching *measId* exists in the *measIdList* within the *VarMeasConfig*:
 - 3> replace the entry with the value received for this *measId*;
 - 2> else:
 - 3> add a new entry for this *measId* within the *VarMeasConfig*;
 - 2> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 2> stop the periodical reporting timer or timer T321 or timer T322, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;
- NOTE 1: If the *measId* associated with *reportConfig* for conditional reconfiguration is modified, the conditions are considered to be not fulfilled as specified in 5.3.5.13.4.
 - 2> if the reportType is set to reportCGI in the reportConfig associated with this measId:
 - 3> if the measObject associated with this measId concerns E-UTRA:

- 4> if the useAutonomousGaps is included in the reportConfig associated with this measId:
 - 5> start timer T321 with the timer value set to 200 ms for this *measId*;
- 4> else:
 - 5> start timer T321 with the timer value set to 1 second for this *measId*;
- 3> if the *measObject* associated with this *measId* concerns NR:
 - 4> if the *measObject* associated with this *measId* concerns FR1:
 - 5> if the useAutonomousGaps is included in the reportConfig associated with this measId:
 - 6> if the UE is a RedCap UE with 1 Rx branch
 - 7> start timer T321 with the timer value set to 3 seconds for this *measId*;
 - 6> else
 - 7> start timer T321 with the timer value set to 2 seconds for this *measId*;
 - 5> else:
 - 6> start timer T321 with the timer value set to 2 seconds for this *measId*;
 - 4> if the *measObject* associated with this *measId* concerns FR2:
 - 5> if the useAutonomousGaps is included in the reportConfig associated with this measId:
 - 6> if the UE is a RedCap UE with 1 Rx branch
 - 7> start timer T321 with the timer value set to 6 seconds for this measld;
 - 6> else
 - 7> start timer T321 with the timer value set to 5 seconds for this *measId*;
 - 5> else:
 - 6> start timer T321 with the timer value set to 16 seconds for this measld.
- 2> if the reportType is set to reportSFTD in the reportConfigNR associated with this measId and the drx-SFTD-NeighMeas is included:
 - 3> if the *measObject* associated with this *measId* concerns FR1:
 - 4> start timer T322 with the timer value set to 3 seconds for this *measId*;
 - 3> if the *measObject* associated with this *measId* concerns FR2:
 - 4> start timer T322 with the timer value set to 24 seconds for this measld.

5.5.2.4 Measurement object removal

- 1> for each *measObjectId* included in the received *measObjectToRemoveList* that is part of *measObjectList* in *VarMeasConfig*:
 - 2> remove the entry with the matching measObjectId from the measObjectList within the VarMeasConfig;
 - 2> remove all measId associated with this measObjectId from the measIdList within the VarMeasConfig, if any;
 - 2> if a *measId* is removed from the *measIdList*:
 - 3> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;

3> stop the periodical reporting timer or timer T321 or timer T322, whichever is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*.

NOTE: The UE does not consider the message as erroneous if the *measObjectToRemoveList* includes any *measObjectId* value that is not part of the current UE configuration.

5.5.2.5 Measurement object addition/modification

- 1> for each measObjectId included in the received measObjectToAddModList:
 - 2> if an entry with the matching *measObjectId* exists in the *measObjectList* within the *VarMeasConfig*, for this entry:
 - 3> reconfigure the entry with the value received for this <code>measObject</code>, except for the fields <code>cellsToAddModList</code>, <code>excludedCellsToAddModList</code>, <code>allowedCellsToAddModList</code>, <code>cellsToRemoveList</code>, <code>excludedCellsToRemoveList</code>, <code>allowedCellsToRemoveList</code>, <code>tx-PoolMeasToAddModList</code>, <code>ssb-PositionQCL-CellsToRemoveList</code>, <code>ssb-PositionQCL-CellsToAddModList</code>, <code>cca-CellsToRemoveList</code>, <code>and cca-CellsToAddModList</code>;
 - 3> if the received *measObject* includes the *cellsToRemoveList*:
 - 4> for each *physCellId* included in the *cellsToRemoveList*:
 - 5> remove the entry with the matching *physCellId* from the *cellsToAddModList*;
 - 3> if the received *measObject* includes the *cellsToAddModList*:
 - 4> for each *physCellId* value included in the *cellsToAddModList*:
 - 5> if an entry with the matching *physCellId* exists in the *cellsToAddModList*:
 - 6> replace the entry with the value received for this *physCellId*;
 - 5> else:
 - 6> add a new entry for the received *physCellId* to the *cellsToAddModList*;
 - 3> if the received *measObject* includes the *excludedCellsToRemoveList*:
 - 4> for each pci-RangeIndex included in the excludedCellsToRemoveList:
 - 5> remove the entry with the matching *pci-RangeIndex* from the *excludedCellsToAddModList*;
- NOTE 1: For each *pci-RangeIndex* included in the *excludedCellsToRemoveList* that concerns overlapping ranges of cells, a cell is removed from the exclude-list of cells only if all PCI ranges containing it are removed.
 - 3> if the received measObject includes the excludedCellsToAddModList:
 - 4> for each *pci-RangeIndex* included in the *excludedCellsToAddModList*:
 - 5> if an entry with the matching pci-RangeIndex is included in the excludedCellsToAddModList:
 - 6> replace the entry with the value received for this *pci-RangeIndex*;
 - 5> else:
 - 6> add a new entry for the received *pci-RangeIndex* to the *excludedCellsToAddModList*;
 - 3> if the received *measObject* includes the *allowedCellsToRemoveList*:
 - 4> for each *pci-RangeIndex* included in the *allowedCellsToRemoveList*:
 - 5> remove the entry with the matching pci-RangeIndex from the allowedCellsToAddModList;

- NOTE2: For each *pci-RangeIndex* included in the *allowedCellsToRemoveList* that concerns overlapping ranges of cells, a cell is removed from the allow-list of cells only if all PCI ranges containing it are removed.
 - 3> if the received *measObject* includes the *allowedCellsToAddModList*:
 - 4> for each *pci-RangeIndex* included in the *allowedCellsToAddModList*:
 - 5> if an entry with the matching pci-RangeIndex is included in the allowedCellsToAddModList:
 - 6> replace the entry with the value received for this *pci-RangeIndex*;
 - 5> else:
 - 6> add a new entry for the received pci-RangeIndex to the allowedCellsToAddModList
 - 3> for each measId associated with this measObjectId in the measIdList within the VarMeasConfig, if any:
 - 4> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 4> stop the periodical reporting timer or timer T321 or timer T322, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;
 - 3> if the received *measObject* includes the *tx-PoolMeasToRemoveList*:
 - 4> for each transmission resource pool indicated in *tx-PoolMeasToRemoveList*:
 - 5> remove the entry with the matching identity of the transmission resource pool from the *tx-PoolMeasToAddModList*;
 - 3> if the received *measObject* includes the *tx-PoolMeasToAddModList*:
 - 4> for each transmission resource pool indicated in *tx-PoolMeasToAddModList*:
 - 5> if an entry with the matching identity of the transmission resource pool exists in the *tx-PoolMeasToAddModList*:
 - 6> replace the entry with the value received for this transmission resource pool;
 - 5> else:
 - 6> add a new entry for the received identity of the transmission resource pool to the *tx-PoolMeasToAddModList*;
 - 3> if the received *measObject* includes the *ssb-PositionQCL-CellsToRemoveList*:
 - 4> for each *physCellId* included in the *ssb-PositionQCL-CellsToRemoveList*:
 - 5> remove the entry with the matching *physCellId* from the *ssb-PositionQCL-CellsToAddModList*;
 - 3> if the received *measObject* includes the *ssb-PositionQCL-CellsToAddModList*:
 - 4> for each physCellId included in the ssb-PositionQCL-CellsToAddModList:
 - 5> if an entry with the matching *physCellId* exists in the *ssb-PositionQCL-CellsToAddModList*:
 - 6> replace the entry with the value received for this *physCellId*;
 - 5> else:
 - 6> add a new entry for the received physCellId to the ssb-PositionQCL-CellsToAddModList;
 - 3> if the received *measObject* includes the *cca-CellsToRemoveList*:
 - 4> for each *physCellId* included in the *cca-CellsToRemoveList*:
 - 5> remove the entry with the matching *physCellId* from the *cca-CellsToAddModList*;
 - 3> if the received *measObject* includes the *cca-CellsToAddModList*:

- 4> for each physCellId included in the cca-CellsToAddModList:
 - 5> if an entry with the matching physCellId exists in the cca-CellsToAddModList:
 - 6> replace the entry with the value received for this *physCellId*;
 - 5> else:
 - 6> add a new entry for the received *physCellId* to the *cca-CellsToAddModList*;
- 2> else:

3> add a new entry for the received *measObject* to the *measObjectList* within *VarMeasConfig*.

5.5.2.6 Reporting configuration removal

The UE shall:

- 1> for each *reportConfigId* included in the received *reportConfigToRemoveList* that is part of the current UE configuration in *VarMeasConfig*:
 - 2> remove the entry with the matching reportConfigId from the reportConfigList within the VarMeasConfig;
 - 2> remove all measId associated with the reportConfigId from the measIdList within the VarMeasConfig, if any;
 - 2> if a *measId* is removed from the *measIdList*:
 - 3> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 3> stop the periodical reporting timer or timer T321 or timer T322, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*.

NOTE: The UE does not consider the message as erroneous if the *reportConfigToRemoveList* includes any *reportConfigId* value that is not part of the current UE configuration.

5.5.2.7 Reporting configuration addition/modification

The UE shall:

- 1> for each reportConfigId included in the received reportConfigToAddModList:
 - 2> if an entry with the matching *reportConfigId* exists in the *reportConfigList* within the *VarMeasConfig*, for this entry:
 - 3> reconfigure the entry with the value received for this *reportConfig*;
 - 3> for each *measId* associated with this *reportConfigId* included in the *measIdList* within the *VarMeasConfig*, if any:
 - 4> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 4> stop the periodical reporting timer or timer T321 or timer T322, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;
 - 2> else:
 - 3> add a new entry for the received reportConfig to the reportConfigList within the VarMeasConfig.

5.5.2.8 Quantity configuration

- 1> for each RAT for which the received *quantityConfig* includes parameter(s):
 - 2> set the corresponding parameter(s) in *quantityConfig* within *VarMeasConfig* to the value of the received *quantityConfig* parameter(s);

- 1> for each *measId* included in the *measIdList* within *VarMeasConfig*:
 - 2> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 2> stop the periodical reporting timer or timer T321 or timer T322, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*.

5.5.2.9 Measurement gap configuration

- 1> if *gapFR1* is set to *setup*:
 - 2> if an FR1 measurement gap configuration configured by *gapFR1* is already setup, release the FR1 measurement gap configuration;
 - 2> setup the FR1 measurement gap configuration indicated by the *gapFR1* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition:

```
SFN mod T = \text{FLOOR}(gapOffset/10);
subframe = gapOffset \mod 10;
with T = \text{MGRP}/10 as defined in TS 38.133 [14];
```

- 2> apply the specified timing advance *mgta* to the gap occurrences calculated above (i.e. the UE starts the measurement *mgta* ms before the gap subframe occurrences);
- 1> else if *gapFR1* is set to *release*:
 - 2> release the FR1 measurement gap configuration configured by *gapFR1*;
- 1> if *gapFR2* is set to *setup*:
 - 2> if an FR2 measurement gap configuration configured by *gapFR2* is already setup, release the FR2 measurement gap configuration;
 - 2> setup the FR2 measurement gap configuration indicated by the *gapFR2* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition:

```
SFN mod T = \text{FLOOR}(gapOffset/10);
subframe = gapOffset \mod 10;
with T = \text{MGRP}/10 as defined in TS 38.133 [14];
```

- 2> apply the specified timing advance *mgta* to the gap occurrences calculated above (i.e. the UE starts the measurement *mgta* ms before the gap subframe occurrences);
- 1> else if *gapFR2* is set to *release*:
 - 2> release the FR2 measurement gap configuration configured by gapFR2;
- 1> if *gapUE* is set to *setup*:
 - 2> if a per UE measurement gap configuration configured by *gapUE* is already setup, release the per UE measurement gap configuration;
 - 2> setup the per UE measurement gap configuration indicated by the *gapUE* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition:

```
SFN mod T = FLOOR(gapOffset/10);
subframe = gapOffset mod 10;
```

- with T = MGRP/10 as defined in TS 38.133 [14];
- 2> apply the specified timing advance *mgta* to the gap occurrences calculated above (i.e. the UE starts the measurement *mgta* ms before the gap subframe occurrences);
- 1> else if *gapUE* is set to *release*:
 - 2> release the per UE measurement gap configuration configured by gapUE.
- 1> for each measGapId included in the received gapToReleaseList:
 - 2> release the measurement gap configuration associated with the measGapId;
- 1> for each measPosPreConfigGapId included in the received posMeasGapPreConfigToReleaseList:
 - 2> release the measurement gap configuration associated with the measPosPreConfigGapId;
- 1> for each GapConfig received in gapToAddModList:
 - 2> setup measurement gap configuration indicated by the *GapConfig* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition:

```
SFN mod T = \text{FLOOR}(gapOffset/10);
subframe = gapOffset \mod 10;
with T = \text{MGRP}/10 as defined in TS 38.133 [14];
```

- 2> apply the specified timing advance *mgta* to the gap occurrences calculated above (i.e. the UE starts the measurement *mgta* ms before the gap subframe occurrences);
- 2> apply the measurement gap as per UE measurement gap, FR1 measurement gap, or FR2 measurement gap according to the *gapType* indicated by the *GapConfig*;
- 2> associate the measurement gap with the measGapId indicated by the GapConfig;
- 2> if *gapSharing* in the *GapConfig* is present:
 - 3> setup the gap sharing configuration for the measurement gap in accordance with the received *gapSharing* as defined in TS 38.133 [14];
- 2> else:
 - 3> release the gap sharing configuration (if configured) for the measurement gap;
- 1> for each PosGapConfig received in PosMeasGapPreConfigToAddModList:
 - 2> if a measurement gap configuration associated with the *measPosPreConfigGapId* indicated by the *PosGapConfig* is already setup:
 - 3> release the measurement gap configuration;
 - 2> setup measurement gap configuration indicated by the *PosGapConfig* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition:

```
SFN mod T = \text{FLOOR}(gapOffset/10);
subframe = gapOffset \mod 10;
with T = \text{MGRP}/10 as defined in TS 38.133 [14];
```

- 2> apply the specified timing advance *mgta* to the gap occurrences calculated above (i.e. the UE starts the measurement *mgta* ms before the gap subframe occurrences);
- 2> configure the measurement gap as indicated by *gapType*;
- 1> for each FR1, FR2, and per UE measurement gap that is setup:

- 2> if the measurement gap is configured by *GapConfig* and *preConfigInd-r17* in the corresponding *GapConfig* is present:
 - 3> determine whether the measurement gap is activated or not according to TS 38.133 [14];
- 2> else if the measurement gap is configured by *PosGapConfig*:
 - 3> consider the measurement gap to be deactivated;
- 2> else:
 - 3> consider the measurement gap to be activated.
- NOTE 1: For FR2 gap configuration with synchronous CA, for the UE in NE-DC or NR-DC, the SFN and subframe of the serving cell indicated by the *refServCellIndicator* is used in the gap calculation. Otherwise, the SFN and subframe of a serving cell on FR2 frequency is used in the gap calculation
- NOTE 2: For FR1 gap or per UE gap configuration, for the UE in NE-DC or NR-DC, the SFN and subframe of the serving cell indicated by the *refServCellIndicator* in is used in the gap calculation. Otherwise, the SFN and subframe of the PCell is used in the gap calculation.
- NOTE 3: For FR2 gap configuration with asynchronous CA, for the UE in NE-DC or NR-DC, the SFN and subframe of the serving cell indicated by the *refServCellIndicator* and *refFR2ServCellAsyncCA* is used in the gap calculation. Otherwise, the SFN and subframe of a serving cell on FR2 frequency indicated by the *refFR2ServCellAsyncCA* is used in the gap calculation

5.5.2.10 Reference signal measurement timing configuration

The UE shall setup the first SS/PBCH block measurement timing configuration (SMTC) in accordance with the received *periodicityAndOffset* parameter (providing *Periodicity* and *Offset* value for the following condition) in the *smtc1* configuration. The first subframe of each SMTC occasion occurs at an SFN and subframe of the NR SpCell meeting the following condition:

```
SFN mod T = (FLOOR (Offset/10));
if the Periodicity is larger than sf5:
subframe = Offset \mod 10;
else:
subframe = Offset or (Offset +5);
with T = CEIL(Periodicity/10).
```

If *smtc2* is present, for cells indicated in the *pci-List* parameter in *smtc2* in the same *MeasObjectNR*, the UE shall setup an additional SS/PBCH block measurement timing configuration (SMTC) in accordance with the received *periodicity* parameter in the *smtc2* configuration and use the *Offset* (derived from parameter *periodicityAndOffset*) and *duration* parameter from the *smtc1* configuration. The first subframe of each SMTC occasion occurs at an SFN and subframe of the NR SpCell meeting the above condition.

If *smtc2-LP* is present, for cells indicated in the *pci-List* parameter in *smtc2-LP* in the same frequency (for intra frequency cell reselection) or different frequency (for inter frequency cell reselection), the UE shall setup an additional SS/PBCH block measurement timing configuration (SMTC) in accordance with the received *periodicity* parameter in the *smtc2-LP* configuration and use the *Offset* (derived from parameter *periodicityAndOffset*) and *duration* parameter from the *smtc* configuration for that frequency. The first subframe of each SMTC occasion occurs at an SFN and subframe of the NR SpCell or serving cell (for cell reselection) meeting the above condition.

If *smtc3list* is present, for cells indicated in the *pci-List* parameter in each *SSB-MTC3* element of the list in the same *MeasObjectNR*, the IAB-MT shall setup an additional SS block measurement timing configuration in accordance with the received *periodicityAndOffset* parameter (using same condition as *smtc1* to identify the SFN and the subframe for SMTC occasion) in each SSB-MTC3 configuration and use the duration and *ssb-ToMeasure* parameters from each SSB-MTC3 configuration.

If *smtc4list* is present, for cells indicated in the *pci-List* parameter in each *SSB-MTC4* element of the list in the same *MeasObjectNR*, the UE shall setup an additional SS/PBCH block measurement timing configuration (SMTC) in accordance with the received *Offset* parameter in the *smtc4* configuration and use the *periodicity* (derived from parameter *periodicityAndOffset*) and *duration* parameter from the *smtc1* configuration. The first subframe of each SMTC occasion occurs at an SFN and subframe of the NR SpCell meeting the above condition.

On the indicated *ssbFrequency*, the UE shall not consider SS/PBCH block transmission in subframes outside the SMTC occasion for RRM measurements based on SS/PBCH blocks and for RRM measurements based on CSI-RS except for SFTD measurement (see TS 38.133 [14], clause 9.3.8).

5.5.2.10a RSSI measurement timing configuration

The UE shall setup the RSSI measurement timing configuration (RMTC) in accordance with the received *rmtc-Periodicity* and, if configured, with *rmtc-SubframeOffset* i.e. the first symbol of each RMTC occasion occurs at first symbol of an SFN and subframe of the NR SpCell meeting the following condition:

```
SFN mod T = \text{FLOOR}(rmtc\text{-}SubframeOffset/10);
subframe = rmtc\text{-}SubframeOffset \mod 10;
with T = rmtc\text{-}Periodicity/10;
```

On the frequency configured by *rmtc-Frequency*, the UE shall not consider RSSI measurements outside the configured RMTC occasion which lasts for *measDurationSymbols* for RSSI and channel occupancy measurements.

The UE derives the RSSI measurement duration from a combination of *measDurationSymbols* and *ref-SCS-CP*. At least for RSSI measurement confined within the active DL BWP, the UE performs RSSI measurement using the numerology of the active DL BWP during the derived measurement duration. Otherwise, the numerology used by the UE for measurements is up to UE implementation. If configured, the UE performs RSSI measurements on a bandwidth in accordance with the received *rmtc-Bandwidth*. If configured, the UE performs RSSI measurements according to the TCI state configured by *tci-StateId* in the reference BWP configured by *ref-BWPId* of the reference serving cell configured by *ref-ServCellId* (see TS 38.133 [14], clause 9.2A.7 and clause 9.3A.8). If the UE has no serving cell in FR2-2 and configured with inter-frequency RSSI measurement in FR2-2, it is up to the UE implementation how to determine the spatial domain filter for the inter-frequency RSSI measurement in FR2-2.

5.5.2.11 Measurement gap sharing configuration

- 1> if *gapSharingFR1* is set to *setup*:
 - 2> if an FR1 measurement gap sharing configuration configured by *gapSharingFR1* is already setup:
 - 3> release the FR1 measurement gap sharing configuration configured by gapSharingFR1;
 - 2> setup the FR1 measurement gap sharing configuration indicated by the *measGapSharingConfig* in accordance with the received *gapSharingFR1* as defined in TS 38.133 [14];
- 1> else if *gapSharingFR1* is set to *release*:
 - 2> release the FR1 measurement gap sharing configuration configured by gapSharingFR1;
- 1> if *gapSharingFR2* is set to *setup*:
 - 2> if an FR2 measurement gap sharing configuration configured by gapSharingFR2 is already setup:
 - 3> release the FR2 measurement gap sharing configuration configured by gapSharingFR2;
 - 2> setup the FR2 measurement gap sharing configuration indicated by the *measGapSharingConfig* in accordance with the received *gapSharingFR2* as defined in TS 38.133 [14];
- 1> else if *gapSharingFR2* is set to *release*:
 - 2> release the FR2 measurement gap sharing configuration configured by gapSharingFR2.

- 1> if *gapSharingUE* is set to *setup*:
 - 2> if a per UE measurement gap sharing configuration configured by gapSharingUE is already setup:
 - 3> release the per UE measurement gap sharing configuration configured by gapSharingUE;
 - 2> setup the per UE measurement gap sharing configuration indicated by the *measGapSharingConfig* in accordance with the received *gapSharingUE* as defined in TS 38.133 [14];
- 1> else if *gapSharingUE* is set to *release*:
 - 2> release the per UE measurement gap sharing configuration configured by gapSharingUE.

5.5.3 Performing measurements

5.5.3.1 General

An RRC_CONNECTED UE shall derive cell measurement results by measuring one or multiple beams associated per cell as configured by the network, as described in 5.5.3.3. For all cell measurement results, except for RSSI, and CLI measurement results in RRC_CONNECTED, the UE applies the layer 3 filtering as specified in 5.5.3.2, before using the measured results for evaluation of reporting criteria, measurement reporting or the criteria to trigger conditional reconfiguration execution. For cell measurements, the network can configure RSRP, RSRQ, SINR, RSCP or EcN0 as trigger quantity. For CLI measurements, the network can configure SRS-RSRP or CLI-RSSI as trigger quantity. For cell and beam measurements, reporting quantities can be any combination of quantities (i.e. only RSRP; only RSRQ; only SINR; RSRP and RSRQ; RSRP and SINR; RSRQ and SINR; RSRP, RSRQ and SINR; only RSCP; only EcN0; RSCP and EcN0), irrespective of the trigger quantity, and for CLI measurements, reporting quantities can be either SRS-RSRP or CLI-RSSI. For conditional reconfiguration execution, the network can configure up to 2 quantities, both using same RS type. The UE does not apply the layer 3 filtering as specified in 5.5.3.2 to derive the CBR measurements. The UE does not apply the layer 3 filtering as specified in 5.5.3.2 to derive the Rx-Tx time difference measurements.

The network may also configure the UE to report measurement information per beam (which can either be measurement results per beam with respective beam identifier(s) or only beam identifier(s)), derived as described in 5.5.3.3a. If beam measurement information is configured to be included in measurement reports, the UE applies the layer 3 beam filtering as specified in 5.5.3.2. On the other hand, the exact L1 filtering of beam measurements used to derive cell measurement results is implementation dependent.

- 1> whenever the UE has a *measConfig*, perform RSRP and RSRQ measurements for each serving cell for which *servingCellMO* is configured as follows:
 - 2> if the reportConfig associated with at least one measId included in the measIdList within VarMeasConfig contains an rsType set to ssb and ssb-ConfigMobility is configured in the measObject indicated by the servingCellMO:
 - 3> if the reportConfig associated with at least one measId included in the measIdList within VarMeasConfig contains a reportQuantityRS-Indexes and maxNrofRS-IndexesToReport and contains an rsType set to ssb:
 - 4> derive layer 3 filtered RSRP and RSRQ per beam for the serving cell based on SS/PBCH block, as described in 5.5.3.3a;
 - 3> derive serving cell measurement results based on SS/PBCH block, as described in 5.5.3.3;
 - 2> if the *reportConfig* associated with at least one *measId* included in the *measIdList* within *VarMeasConfig* contains an *rsType* set to *csi-rs* and *CSI-RS-ResourceConfigMobility* is configured in the *measObject* indicated by the *servingCellMO*:
 - 3> if the reportConfig associated with at least one measId included in the measIdList within VarMeasConfig contains a reportQuantityRS-Indexes and maxNrofRS-IndexesToReport and contains an rsType set to csirs:
 - 4> derive layer 3 filtered RSRP and RSRQ per beam for the serving cell based on CSI-RS, as described in 5.5.3.3a:

- 3> derive serving cell measurement results based on CSI-RS, as described in 5.5.3.3;
- 1> for each serving cell for which *servingCellMO* is configured, if the *reportConfig* associated with at least one *measId* included in the *measIdList* within *VarMeasConfig* contains SINR as trigger quantity and/or reporting quantity:
 - 2> if the reportConfig contains rsType set to ssb and ssb-ConfigMobility is configured in the servingCellMO:
 - 3> if the reportConfigcontains a reportQuantityRS-Indexes and maxNrofRS-IndexesToReport:
 - 4> derive layer 3 filtered SINR per beam for the serving cell based on SS/PBCH block, as described in 5.5.3.3a;
 - 3> derive serving cell SINR based on SS/PBCH block, as described in 5.5.3.3;
 - 2> if the *reportConfig* contains *rsType* set to *csi-rs* and *CSI-RS-ResourceConfigMobility* is configured in the *servingCellMO*:
 - 3> if the reportConfigcontains a reportQuantityRS-Indexes and maxNrofRS-IndexesToReport:
 - 4> derive layer 3 filtered SINR per beam for the serving cell based on CSI-RS, as described in 5.5.3.3a;
 - 3> derive serving cell SINR based on CSI-RS, as described in 5.5.3.3;
- 1> for each measId included in the measIdList within VarMeasConfig:
 - 2> if the reportType for the associated reportConfig is set to reportCGI and timer T321 is running:
 - 3> if useAutonomousGaps is configured for the associated reportConfig:
 - 4> perform the corresponding measurements on the frequency and RAT indicated in the associated *measObject* using autonomous gaps as necessary;
 - 3> else:
 - 4> perform the corresponding measurements on the frequency and RAT indicated in the associated *measObject* using available idle periods;
 - 3> if the cell indicated by *reportCGI* field for the associated *measObject* is an NR cell and that indicated cell is broadcasting *SIB1* (see TS 38.213 [13], clause 13):
 - 4> try to acquire SIB1 in the concerned cell;
 - 3> if the cell indicated by *reportCGI* field is an E-UTRA cell:
 - 4> try to acquire SystemInformationBlockType1 in the concerned cell;
 - 2> if the *ul-DelayValueConfig* is configured for the associated *reportConfig*:
 - 3> ignore the *measObject*;
 - 3> for each of the configured DRBs, configure the PDCP layer to perform corresponding average UL PDCP packet delay measurement per DRB;
 - 2> if the *ul-ExcessDelayConfig* is configured for the associated *reportConfig*:
 - 3> ignore the *measObject*;
 - 3> for each of the configured DRBs, configure the PDCP layer to perform corresponding UL PDCP Excess Packet Delay delay measurement according to the configured threshold per DRB;
 - 2> if the reportType for the associated reportConfig is periodical, eventTriggered; or
 - 2> if the reportType for the associated reportConfig is condTriggerConfig, the measId is within the MCG measConfig and is indicated in the condExecutionCond associated to a condReconfigId in the MCG VarConditionalReconfig (for CHO, CPA or MN-initiated inter-SN CPC in NR-DC); or

- 2> if the reportType for the associated reportConfig is condTriggerConfig, the measId is within the SCG VarMeasConfig and is indicated in the condExecutionCond associated to a condReconfigId in the SCG VarConditionalReconfig (for intra-SN CPC); or
- 2> if the reportType for the associated reportConfig is condTriggerConfig, the measId is within the SCG VarMeasConfig and is indicated in the condExecutionCondSCG associated to a condReconfigId in the MCG VarConditionalReconfig (for SN-initiated inter-SN CPC in NR-DC); or
- 2> if the *reportType* for the associated *reportConfig* is *condTriggerConfig*, the *measId* is within the SCG *VarMeasConfig* and is indicated in the *triggerConditionSN* associated to a *condReconfigurationId* in *VarConditionalReconfiguration* as specified in TS 36.331 [10] (for SN-initiated inter-SN CPC in EN-DC):
 - 3> if a measurement gap configuration is setup, or
 - 3> if the UE does not require measurement gaps to perform the concerned measurements:
 - 4> if s-MeasureConfig is not configured, or
 - 4> if *s-MeasureConfig* is set to *ssb-RSRP* and the NR SpCell RSRP based on SS/PBCH block, after layer 3 filtering, is lower than *ssb-RSRP*, or
 - 4> if *s-MeasureConfig* is set to *csi-RSRP* and the NR SpCell RSRP based on CSI-RS, after layer 3 filtering, is lower than *csi-RSRP*:
 - 5> if the *measObject* is associated to NR and the *rsType* is set to *csi-rs*:
 - 6> if reportQuantityRS-Indexes and maxNrofRS-IndexesToReport for the associated reportConfig are configured:
 - 7> derive layer 3 filtered beam measurements only based on CSI-RS for each measurement quantity indicated in *reportQuantityRS-Indexes*, as described in 5.5.3.3a;
 - 6> derive cell measurement results based on CSI-RS for the trigger quantity and each measurement quantity indicated in *reportQuantityCell* using parameters from the associated *measObject*, as described in 5.5.3.3;
 - 5> if the *measObject* is associated to NR and the *rsType* is set to *ssb*:
 - 6> if reportQuantityRS-Indexes and maxNrofRS-IndexesToReport for the associated reportConfig are configured:
 - 7> derive layer 3 beam measurements only based on SS/PBCH block for each measurement quantity indicated in *reportQuantityRS-Indexes*, as described in 5.5.3.3a;
 - 6> derive cell measurement results based on SS/PBCH block for the trigger quantity and each measurement quantity indicated in *reportQuantityCell* using parameters from the associated *measObject*, as described in 5.5.3.3;
 - 5> if the *measObject* is associated to E-UTRA:
 - 6> perform the corresponding measurements associated to neighbouring cells on the frequencies indicated in the concerned *measObject*, as described in 5.5.3.2;
 - 5> if the measObject is associated to UTRA-FDD:
 - 6> perform the corresponding measurements associated to neighbouring cells on the frequencies indicated in the concerned *measObject*, as described in 5.5.3.2;
 - 5> if the measObject is associated to L2 U2N Relay UE:
 - 6> perform the corresponding measurements associated to candidate Relay UEs on the frequencies indicated in the concerned *measObject*, as described in 5.5.3.4;
 - 4> if the *measRSSI-ReportConfig* is configured in the associated *reportConfig*:
 - 5> perform the RSSI and channel occupancy measurements on the frequency indicated in the associated *measObject*;

- NOTE 0: The network avoids configuring UEs supporting only CHO and/or Rel-16 CPC with measurements not referred to by any execution condition.
 - 2> if the *reportType* for the associated *reportConfig* is set to *reportSFTD* and the *numberOfReportsSent* as defined within the *VarMeasReportList* for this *measId* is less than one:
 - 3> if the reportSFTD-Meas is set to true:
 - 4> if the *measObject* is associated to E-UTRA:
 - 5> perform SFTD measurements between the PCell and the E-UTRA PSCell;
 - 5> if the *reportRSRP* is set to *true*;
 - 6> perform RSRP measurements for the E-UTRA PSCell;
 - 4> else if the *measObject* is associated to NR:
 - 5> perform SFTD measurements between the PCell and the NR PSCell;
 - 5> if the *reportRSRP* is set to *true*;
 - 6> perform RSRP measurements for the NR PSCell based on SSB;
 - 3> else if the reportSFTD-NeighMeas is included:
 - 4> if the *measObject* is associated to NR:
 - 5> if the *drx-SFTD-NeighMeas* is included:
 - 6> perform SFTD measurements between the PCell and the NR neighbouring cell(s) detected based on parameters in the associated *measObject* using available idle periods;
 - 5> else:
 - 6> perform SFTD measurements between the PCell and the NR neighbouring cell(s) detected based on parameters in the associated *measObject*;
 - 5> if the *reportRSRP* is set to *true*:
 - 6> perform RSRP measurements based on SSB for the NR neighbouring cell(s) detected based on parameters in the associated *measObject*;
 - 2> if the *reportType* for the associated *reportConfig* is *cli-Periodical* or *cli-EventTriggered*:
 - 3> perform the corresponding measurements associated to CLI measurement resources indicated in the concerned *measObjectCLI*;
 - 2> perform the evaluation of reporting criteria as specified in 5.5.4, except if *reportConfig* is *condTriggerConfig*.

The UE acting as a L2 U2N Remote UE whenever configured with *measConfig* shall:

- 1> perform the corresponding measurements associated to the serving L2 U2N Relay UE, as described in 5.5.3.4;
- NOTE 1: The evaluation of conditional reconfiguration execution criteria is specified in 5.3.5.13.
- The UE capable of Rx-Tx time difference measurement when configured with measObjectRxTxDiff shall:
 - 1> perform the corresponding Rx-Tx time difference measurements associated with downlink reference signals indicated in the concerned *measObjectRxTxDiff*.

The UE capable of CBR measurement when configured to transmit NR sidelink communication/discovery shall:

- 1> If the frequency used for NR sidelink communication/discovery is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-ConfigCommonNR* within *SIB12*:
 - 2> if the UE is in RRC_IDLE or in RRC_INACTIVE:

- 3> if configured with NR sidelink communication and the cell chosen for NR sidelink communication provides *SIB12* which includes *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* for the concerned frequency; or
- 3> if configured with NR sidelink discovery and the cell chosen for NR sidelink discovery provides SIB12 which includes sl-TxPoolSelectedNormal or sl-TxPoolExceptional but does not include sl-DiscTxPoolSelected for the concerned frequency:
 - 4> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;
- 3> if configured with NR sidelink discovery and the cell chosen for NR sidelink discovery provides SIB12 which includes sl-DiscTxPoolSelected for the concerned frequency:
 - 4> perform CBR measurement on pools in *sl-DiscTxPoolSelected* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;

2> if the UE is in RRC_CONNECTED:

- 3> if tx-PoolMeasToAddModList is included in VarMeasConfig:
 - 4> perform CBR measurements on each transmission resource pool indicated in the *tx-PoolMeasToAddModList*;
- 3> if *sl-DiscTxPoolSelected*, *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling* or *sl-TxPoolExceptional* is included in *sl-ConfigDedicatedNR* for the concerned frequency within *RRCReconfiguration*:
 - 4> perform CBR measurement on pool(s) in *sl-DiscTxPoolSelected*, *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling* and *sl-TxPoolExceptional* if included in *sl-ConfigDedicatedNR* for the concerned frequency within *RRCReconfiguration*;

3> else:

- 4> if configured with NR sidelink communication and the cell chosen for NR sidelink communication provides SIB12 which includes sl-TxPoolSelectedNormal or sl-TxPoolExceptional for the concerned frequency; or
- 4> if configured with NR sidelink discovery and the cell chosen for NR sidelink discovery provides SIB12 which includes sl-TxPoolSelectedNormal or sl-TxPoolExceptional but does not provide sl-DiscTxPoolSelected for the concerned frequency:
 - 5> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;
- 4> if configured with NR sidelink discovery and the cell chosen for NR sidelink discovery provides *SIB12* which includes *sl-DiscTxPoolSelected* for the concerned frequency:
 - 5> perform CBR measurement on pools in *sl-DiscTxPoolSelected* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;

- 2> if configured with NR sidelink communication and *sl-TxPoolSelectedNormal* is included in *SidelinkPreconfigNR* for the concerned frequency; or
- 2> if configured with NR sidelink discovery and *sl-TxPoolSelectedNormal* is included in *SidelinkPreconfigNR* but *sl-DiscTxPoolSelected* is not included in *SidelinkPreconfigNR* for the concerned frequency:
 - 3> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal* in *SidelinkPreconfigNR* for the concerned frequency.
- 2> if configured with NR sidelink discovery and *sl-DiscTxPoolSelected* is included in *SidelinkPreconfigNR* for the concerned frequency:
 - 3> perform CBR measurement on pools in sl-DiscTxPoolSelected if included in SidelinkPreconfigNR.

- NOTE 2: In case the configurations for NR sidelink communication and CBR measurement are acquired via the E-UTRA, configurations for NR sidelink communication in SIB12, sl-ConfigDedicatedNR within RRCReconfiguration used in this clause are provided by the configurations in SystemInformationBlockType28, sl-ConfigDedicatedForNR within RRCConnectionReconfiguration as specified in TS 36.331[10], respectively.
- NOTE 3: If a UE that is configured by upper layers to transmit V2X sidelink communication is configured by NR with transmission resource pool(s) and the measurement objects concerning V2X sidelink communication (i.e. by *sl-ConfigDedicatedEUTRA-Info*), it shall perform CBR measurement as specified in clause 5.5.3 of TS 36.331 [10], based on the transmission resource pool(s) and the measurement object(s) concerning V2X sidelink communication configured by NR.
- NOTE 4: For V2X sidelink communication, each of the CBR measurement results is associated with a resource pool, as indicated by the *poolReportId* (see TS 36.331 [10]), that refers to a pool as included in *sl-ConfigDedicatedEUTRA-Info* or *SIB13*.

5.5.3.2 Layer 3 filtering

The UE shall:

- 1> for each cell measurement quantity, each beam measurement quantity, each sidelink measurement quantity as needed in clause 5.8.10, for each CLI measurement quantity that the UE performs measurements according to 5.5.3.1, and for each candidate L2 U2N Relay UE measurement quantity according to 5.5.3.4:
 - 2> filter the measured result, before using for evaluation of reporting criteria or for measurement reporting, by the following formula:

$$F_n = (1-a)*F_{n-1} + a*M_n$$

where

 M_n is the latest received measurement result from the physical layer;

- F_n is the updated filtered measurement result, that is used for evaluation of reporting criteria or for measurement reporting;
- F_{n-1} is the old filtered measurement result, where F_0 is set to M_1 when the first measurement result from the physical layer is received; and for MeasObjectNR, $a = 1/2^{(ki/4)}$, where k_i is the filterCoefficient for the corresponding measurement quantity of the i:th QuantityConfigNR in quantityConfigNR-List, and i is indicated by quantityConfigIndex in MeasObjectNR; for other measurements, $a = 1/2^{(k/4)}$, where k is the filterCoefficient for the corresponding measurement quantity received by the quantityConfig; for UTRA-FDD, $a = 1/2^{(k/4)}$, where k is the filterCoefficient for the corresponding measurement quantity received by quantityConfigUTRA-FDD in the quantityConfig;
- 2> adapt the filter such that the time characteristics of the filter are preserved at different input rates, observing that the *filterCoefficient k* assumes a sample rate equal to X ms; The value of X is equivalent to one intrafrequency L1 measurement period as defined in TS 38.133 [14] assuming non-DRX operation, and depends on frequency range.
- NOTE 1: If k is set to 0, no layer 3 filtering is applicable.
- NOTE 2: The filtering is performed in the same domain as used for evaluation of reporting criteria or for measurement reporting, i.e., logarithmic filtering for logarithmic measurements.
- NOTE 3: The filter input rate is implementation dependent, to fulfil the performance requirements set in TS 38.133 [14]. For further details about the physical layer measurements, see TS 38.133 [14].
- NOTE 4: For CLI-RSSI measurement, it is up to UE implementation whether to reset filtering upon BWP switch.

5.5.3.3 Derivation of cell measurement results

The network may configure the UE in RRC_CONNECTED to derive RSRP, RSRQ and SINR measurement results per cell associated to NR measurement objects based on parameters configured in the *measObject* (e.g. maximum number

of beams to be averaged and beam consolidation thresholds) and in the *reportConfig* (*rsType* to be measured, SS/PBCH block or CSI-RS).

The network may configure the UE in RRC_IDLE or in RRC_INACTIVE to derive RSRP and RSRQ measurement results per cell associated to NR carriers based on parameters configured in *measIdleCarrierListNR* within *VarMeasIdleConfig* for measurements performed according to 5.7.8.2a.

The UE shall:

- 1> for each cell measurement quantity to be derived based on SS/PBCH block:
 - 2> if *nrofSS-BlocksToAverage* is not configured in the associated *measObject* in RRC_CONNECTED or in the associated entry in *measIdleCarrierListNR* within *VarMeasIdleConfig* in RRC_IDLE/RRC_INACTIVE; or
 - 2> if absThreshSS-BlocksConsolidation is not configured in the associated measObject in RRC_CONNECTED or in the associated entry in measIdleCarrierListNR within VarMeasIdleConfig in RRC_IDLE/RRC_INACTIVE; or
 - 2> if the highest beam measurement quantity value is below or equal to absThreshSS-BlocksConsolidation:
 - 3> derive each cell measurement quantity based on SS/PBCH block as the highest beam measurement quantity value, where each beam measurement quantity is described in TS 38.215 [9];

2> else:

- 3> derive each cell measurement quantity based on SS/PBCH block as the linear power scale average of the highest beam measurement quantity values above *absThreshSS-BlocksConsolidation* where the total number of averaged beams shall not exceed *nrofSS-BlocksToAverage*, and where each beam measurement quantity is described in TS 38.215 [9];
- 2> if in RRC_CONNECTED, apply layer 3 cell filtering as described in 5.5.3.2;
- 1> for each cell measurement quantity to be derived based on CSI-RS:
 - 2> consider a CSI-RS resource to be applicable for deriving cell measurements when the concerned CSI-RS resource is included in the csi-rs-CellMobility including the physCellId of the cell in the CSI-RS-ResourceConfigMobility in the associated measObject;
 - 2> if nrofCSI-RS-ResourcesToAverage in the associated measObject is not configured; or
 - 2> if absThreshCSI-RS-Consolidation in the associated measObject is not configured; or
 - 2> if the highest beam measurement quantity value is below or equal to absThreshCSI-RS-Consolidation:
 - 3> derive each cell measurement quantity based on applicable CSI-RS resources for the cell as the highest beam measurement quantity value, where each beam measurement quantity is described in TS 38.215 [9];

2> else:

- 3> derive each cell measurement quantity based on CSI-RS as the linear power scale average of the highest beam measurement quantity values above *absThreshCSI-RS-Consolidation* where the total number of averaged beams shall not exceed *nrofCSI-RS-ResourcesToAverage*;
- 2> apply layer 3 cell filtering as described in 5.5.3.2.

5.5.3.3a Derivation of layer 3 beam filtered measurement

- 1> for each layer 3 beam filtered measurement quantity to be derived based on SS/PBCH block;
 - 2> derive each configured beam measurement quantity based on SS/PBCH block as described in TS 38.215[9], and apply layer 3 beam filtering as described in 5.5.3.2;
- 1> for each layer 3 beam filtered measurement quantity to be derived based on CSI-RS;

2> derive each configured beam measurement quantity based on CSI-RS as described in TS 38.215 [9], and apply layer 3 beam filtering as described in 5.5.3.2.

5.5.3.4 Derivation of L2 U2N Relay UE measurement results

A UE may be configured by network to derive NR sidelink measurement results of serving L2 U2N Relay UE or candidate L2 U2N Relay UEs associated to the measurement objects configured in the *measObjectRelay*.

The UE shall:

- 1> for each L2 U2N Relay UE measurement quantity to be derived:
 - 2> derive the corresponding measurement quantity based on DMRS as described in TS 38.215 [9];
 - 2> apply layer 3 filtering as described in 5.5.3.2;

5.5.4 Measurement report triggering

5.5.4.1 General

If AS security has been activated successfully, the UE shall:

- 1> for each *measId* included in the *measIdList* within *VarMeasConfig*:
 - 2> if the corresponding reportConfig includes a reportType set to eventTriggered or periodical:
 - 3> if the corresponding *measObject* concerns NR:
 - 4> if the corresponding *reportConfig* includes *measRSSI-ReportConfig*:
 - 5> consider the resource indicated by the *rmtc-Config* on the associated frequency to be applicable;
 - 4> if the eventA1 or eventA2 is configured in the corresponding reportConfig:
 - 5> consider only the serving cell to be applicable;
 - 4> if the eventA3 or eventA5 is configured in the corresponding reportConfig:
 - 5> if a serving cell is associated with a *measObjectNR* and neighbours are associated with another *measObjectNR*, consider any serving cell associated with the other *measObjectNR* to be a neighbouring cell as well;
 - 4> if the *eventX2* is configured in the corresponding *reportConfig*:
 - 5> consider only the serving L2 U2N Relay UE to be applicable;
 - 4> if corresponding reportConfig includes reportType set to periodical; or
 - 4> for measurement events other than eventA1, eventA2, eventD1 or eventX2:
 - 5> if *useAllowedCellList* is set to *true*:
 - 6> consider any neighbouring cell detected based on parameters in the associated *measObjectNR* to be applicable when the concerned cell is included in the *allowedCellsToAddModList* defined within the *VarMeasConfig* for this *measId*;
 - 5> else:
 - 6> consider any neighbouring cell detected based on parameters in the associated *measObjectNR* to be applicable when the concerned cell is not included in the *excludedCellsToAddModList* defined within the *VarMeasConfig* for this *measId*;
 - 3> else if the corresponding *measObject* concerns E-UTRA:
 - 4> if eventB1 or eventB2 is configured in the corresponding reportConfig:

- 5> consider a serving cell, if any, on the associated E-UTRA frequency as neighbour cell;
- 4> consider any neighbouring cell detected on the associated frequency to be applicable when the concerned cell is not included in the *excludedCellsToAddModListEUTRAN* defined within the *VarMeasConfig* for this *measId*;
- 3> else if the corresponding *measObject* concerns UTRA-FDD:
 - 4> if eventB1-UTRA-FDD or eventB2-UTRA-FDD is configured in the corresponding reportConfig; or
 - 4> if corresponding reportConfig includes reportType set to periodical:
 - 5> consider a neighbouring cell on the associated frequency to be applicable when the concerned cell is included in the *cellsToAddModList* defined within the *VarMeasConfig* for this *measId*;
- 3> else if the corresponding measObject concerns L2 U2N Relay UE:
 - 4> if eventY1-Relay or eventY2-Relay is configured in the corresponding reportConfig; or
 - 4> if corresponding *reportConfig* includes *reportType* set to *periodical*:
 - 5> consider any L2 U2N Relay UE fulfilling upper layer criteria detected on the associated frequency to be applicable for this *measId*;
- 2> else if the corresponding reportConfig includes a reportType set to reportCGI:
 - 3> consider the cell detected on the associated *measObject* which has a physical cell identity matching the value of the *cellForWhichToReportCGI* included in the corresponding *reportConfig* within the *VarMeasConfig* to be applicable;
- 2> else if the corresponding reportConfig includes a reportType set to reportSFTD:
 - 3> if the corresponding *measObject* concerns NR:
 - 4> if the *reportSFTD-Meas* is set to *true*:
 - 5> consider the NR PSCell to be applicable;
 - 4> else if the *reportSFTD-NeighMeas* is included:
 - 5> if *cellsForWhichToReportSFTD* is configured in the corresponding *reportConfig*:
 - 6> consider any NR neighbouring cell detected on the associated *measObjectNR* which has a physical cell identity that is included in the *cellsForWhichToReportSFTD* to be applicable;
 - 5> else:
 - 6> consider up to 3 strongest NR neighbouring cells detected based on parameters in the associated *measObjectNR* to be applicable when the concerned cells are not included in the *excludedCellsToAddModList* defined within the *VarMeasConfig* for this *measId*;
 - 3> else if the corresponding *measObject* concerns E-UTRA:
 - 4> if the reportSFTD-Meas is set to true:
 - 5> consider the E-UTRA PSCell to be applicable;
- 2> else if the corresponding reportConfig includes a reportType set to cli-Periodical or cli-EventTriggered:
 - 3> consider all CLI measurement resources included in the corresponding measObject to be applicable;
- 2> else if the corresponding reportConfig includes a reportType set to rxTxPeriodical:
 - 3> consider all Rx-Tx time difference measurement resources included in the corresponding *measObject* to be applicable;
- 2> if the corresponding *reportConfig* concerns the reporting for NR sidelink communication/discovery (i.e. *reportConfigNR-SL*):

- 3> consider the transmission resource pools indicated by the *tx-PoolMeasToAddModList* defined within the *VarMeasConfig* for this *measId* to be applicable;
- 2> if the reportType is set to eventTriggered and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more applicable cells for all measurements after layer 3 filtering taken during timeToTrigger defined for this event within the VarMeasConfig, while the VarMeasReportList does not include a measurement reporting entry for this measId (a first cell triggers the event):
 - 3> include a measurement reporting entry within the VarMeasReportList for this measId;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned cell(s) in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*:
 - 3> if *useT312* is set to *true* in *reportConfig* for this event:
 - 4> if T310 for the corresponding SpCell is running; and
 - 4> if T312 is not running for corresponding SpCell:
 - 5> start timer T312 for the corresponding SpCell with the value of T312 configured in the corresponding *measObjectNR*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> else if the *reportType* is set to *eventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable cells not included in the *cellsTriggeredList* for all measurements after layer 3 filtering taken during *timeToTrigger* defined for this event within the *VarMeasConfig* (a subsequent cell triggers the event):
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned cell(s) in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*:
 - 3> if useT312 is set to true in reportConfig for this event:
 - 4> if T310 for the corresponding SpCell is running; and
 - 4> if T312 is not running for corresponding SpCell:
 - 5> start timer T312 for the corresponding SpCell with the value of T312 configured in the corresponding *measObjectNR*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> if the reportType is set to eventTriggered and if the leaving condition applicable for this event is fulfilled for one or more of the cells included in the cellsTriggeredList defined within the VarMeasReportList for this measId for all measurements after layer 3 filtering taken during timeToTrigger defined within the VarMeasConfig for this event:
 - 3> remove the concerned cell(s) in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*:
 - 3> if reportOnLeave is set to true for the corresponding reporting configuration:
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5;
 - 3> if the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId* is empty:
 - 4> remove the measurement reporting entry within the VarMeasReportList for this measId;
 - 4> stop the periodical reporting timer for this *measId*, if running;

- 2> if the reportType is set to eventTriggered and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more applicable L2 U2N Relay UEs for all measurements after layer 3 filtering taken during timeToTrigger defined for this event within the VarMeasConfig, while the VarMeasReportList does not include a measurement reporting entry for this measId (a first L2 U2N Relay UE triggers the event):
 - 3> include a measurement reporting entry within the VarMeasReportList for this measId;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned L2 U2N Relay UE(s) in the *relaysTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> else if the *reportType* is set to *eventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable L2 U2N Relay UEs not included in the *relaysTriggeredList* for all measurements after layer 3 filtering taken during *timeToTrigger* defined for this event within the *VarMeasConfig* (a subsequent L2 U2N Relay UE triggers the event):
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned L2 U2N Relay UE(s) in the *relaysTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> else if the *reportType* is set to *eventTriggered* and if the leaving condition applicable for this event is fulfilled for one or more of the L2 U2N Relay UEs included in the *relaysTriggeredList* defined within the *VarMeasReportList* for this *measId* for all measurements after layer 3 filtering taken during *timeToTrigger* defined within the *VarMeasConfig* for this event:
 - 3> remove the concerned L2 U2N Relay UE(s) in the *relaysTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> if reportOnLeave is set to true for the corresponding reporting configuration:
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5;
 - 3> if the *relaysTriggeredList* defined within the *VarMeasReportList* for this *measId* is empty:
 - 4> remove the measurement reporting entry within the VarMeasReportList for this measId;
 - 4> stop the periodical reporting timer for this *measId*, if running;
- 2> else if the *reportType* is set to *eventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable transmission resource pools for all measurements taken during *timeToTrigger* defined for this event within the *VarMeasConfig*, while the *VarMeasReportList* does not include an measurement reporting entry for this *measId* (a first transmission resource pool triggers the event):
 - 3> include a measurement reporting entry within the VarMeasReportList for this measId;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned transmission resource pool(s) in the *poolsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> else if the *reportType* is set to *eventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable transmission resource pools not included in the *poolsTriggeredList* for all measurements taken during *timeToTrigger* defined for this event within the *VarMeasConfig* (a subsequent transmission resource pool triggers the event):

- 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
- 3> include the concerned transmission resource pool(s) in the *poolsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
- 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> if the reportType is set to eventTriggered and if the leaving condition applicable for this event is fulfilled for one or more applicable transmission resource pools included in the poolsTriggeredList defined within the VarMeasReportList for this measId for all measurements taken during timeToTrigger defined within the VarMeasConfig for this event:
 - 3> remove the concerned transmission resource pool(s) in the *poolsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> if the poolsTriggeredList defined within the VarMeasReportList for this measId is empty:
 - 4> remove the measurement reporting entry within the VarMeasReportList for this measId;
 - 4> stop the periodical reporting timer for this measId, if running
- 2> else if the *reportType* is set to *eventTriggered* and if the *eventId* is set to *eventD1* and if the entering condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled during *timeToTrigger* defined for this event within the *VarMeasConfig*, while the *VarMeasReportList* does not include a measurement reporting entry for this *measId*:
 - 3> include a measurement reporting entry within the VarMeasReportList for this measId;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> else if the reportType is set to eventTriggered and if the eventId is set to eventD1 and if the leaving condition applicable for this event is fulfilled for the associated VarMeasReport within the VarMeasReportList for this measId during timeToTrigger defined within the VarMeasConfig for this event:
 - 3> if reportOnLeave is set to true for the corresponding reporting configuration:
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5;
 - 3> remove the measurement reporting entry within the VarMeasReportList for this measId;
 - 3> stop the periodical reporting timer for this *measId*, if running;

NOTE 1: Void.

- 2> if reportType is set to periodical and if a (first) measurement result is available:
 - 3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> if the corresponding *reportConfig* includes *measRSSI-ReportConfig*:
 - 4> initiate the measurement reporting procedure as specified in 5.5.5 immediately when RSSI sample values are reported by the physical layer after the first L1 measurement duration;
 - 3> else if the corresponding reportConfig includes the ul-DelayValueConfig:
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after a first measurement result is provided from lower layers of the associated DRB identity;
 - 3> else if the corresponding reportConfig includes the ul-ExcessDelayConfig:
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after a first measurement result is provided from lower layers of the associated DRB identity(ies) according to the configured threshold per DRB identity(ies);

- 3> else if the *reportAmount* exceeds 1:
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the NR SpCell or for the serving L2 U2N Relay UE (if the UE is a L2 U2N Remote UE);
- 3> else (i.e. the *reportAmount* is equal to 1):
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the NR SpCell and for the strongest cell among the applicable cells, or for the NR SpCell and for the strongest L2 U2N Relay UEs among the applicable L2 U2N Relay UEs; or initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the serving L2 U2N Relay UE and for the strongest cell among the applicable cells (if the UE is a L2 U2N Remote UE);
- 2> if, in case the corresponding *reportConfig* concerns the reporting for NR sidelink communication/discovery, *reportType* is set to *periodical* and if a (first) measurement result is available:
 - 3> include a measurement reporting entry within the VarMeasReportList for this measId;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the NR SpCell and CBR measurement results become available;
- 2> if the reportType is set to cli-EventTriggered and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more applicable CLI measurement resources for all measurements after layer 3 filtering taken during timeToTrigger defined for this event within the VarMeasConfig, while the VarMeasReportList does not include a measurement reporting entry for this measId (a first CLI measurement resource triggers the event):
 - 3> include a measurement reporting entry within the VarMeasReportList for this measId;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned CLI measurement resource(s) in the *cli-TriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> else if the reportType is set to cli-EventTriggered and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more CLI measurement resources not included in the cli-TriggeredList for all measurements after layer 3 filtering taken during timeToTrigger defined for this event within the VarMeasConfig (a subsequent CLI measurement resource triggers the event):
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned CLI measurement resource(s) in the *cli-TriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> if the *reportType* is set to *cli-EventTriggered* and if the leaving condition applicable for this event is fulfilled for one or more of the CLI measurement resources included in the *cli-TriggeredList* defined within the *VarMeasReportList* for this *measId* for all measurements after layer 3 filtering taken during *timeToTrigger* defined within the *VarMeasConfig* for this event:
 - 3> remove the concerned CLI measurement resource(s) in the *cli-TriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> if reportOnLeave is set to true for the corresponding reporting configuration:
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5;
 - 3> if the *cli-TriggeredList* defined within the *VarMeasReportList* for this *measId* is empty:

- 4> remove the measurement reporting entry within the VarMeasReportList for this measId;
- 4> stop the periodical reporting timer for this measId, if running;
- 2> if reportType is set to cli-Periodical and if a (first) measurement result is available:
 - 3> include a measurement reporting entry within the VarMeasReportList for this measId;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for at least one CLI measurement resource;
- 2> if reportType is set to rxTxPeriodical and if a (first) measurement result is available:
 - 3> include a measurement reporting entry within the VarMeasReportList for this measId;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> upon expiry of the periodical reporting timer for this *measId*:
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5.
- 2> if the corresponding reportConfig includes a reportType is set to reportSFTD:
 - 3> if the corresponding measObject concerns NR:
 - 4> if the *drx-SFTD-NeighMeas* is included:
 - 5> if the quantity to be reported becomes available for each requested pair of PCell and NR cell:
 - 6> stop timer T322;
 - 6> initiate the measurement reporting procedure, as specified in 5.5.5;
 - 4> else
 - 5> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for each requested pair of PCell and NR cell or the maximal measurement reporting delay as specified in TS 38.133 [14];
 - 3> else if the corresponding *measObject* concerns E-UTRA:
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the pair of PCell and E-UTRA PSCell or the maximal measurement reporting delay as specified in TS 38.133 [14];
- 2> if *reportType* is set to *reportCGI*:
 - 3> if the UE acquired the SIB1 or SystemInformationBlockType1 for the requested cell; or
 - 3> if the UE detects that the requested NR cell is not transmitting SIB1 (see TS 38.213 [13], clause 13):
 - 4> stop timer T321;
 - 4> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;
 - 4> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> upon the expiry of T321 for this *measId*:
 - 3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;

- 3> initiate the measurement reporting procedure, as specified in 5.5.5.
- 2> upon the expiry of T322 for this *measId*:
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5.

5.5.4.2 Event A1 (Serving becomes better than threshold)

The UE shall:

- 1> consider the entering condition for this event to be satisfied when condition A1-1, as specified below, is fulfilled;
- 1> consider the leaving condition for this event to be satisfied when condition A1-2, as specified below, is fulfilled;
- 1> for this measurement, consider the NR serving cell corresponding to the associated *measObjectNR* associated with this event.

Inequality A1-1 (Entering condition)

Ms - Hys > Thresh

Inequality A1-2 (Leaving condition)

Ms + Hys < Thresh

The variables in the formula are defined as follows:

Ms is the measurement result of the serving cell, not taking into account any offsets.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigNR for this event).

Thresh is the threshold parameter for this event (i.e. a1-Threshold as defined within reportConfigNR for this event).

Ms is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Hys is expressed in dB.

Thresh is expressed in the same unit as Ms.

5.5.4.3 Event A2 (Serving becomes worse than threshold)

The UE shall:

- 1> consider the entering condition for this event to be satisfied when condition A2-1, as specified below, is fulfilled;
- 1> consider the leaving condition for this event to be satisfied when condition A2-2, as specified below, is fulfilled;
- 1> for this measurement, consider the serving cell indicated by the measObjectNR associated to this event.

Inequality A2-1 (Entering condition)

Ms + Hys < Thresh

Inequality A2-2 (Leaving condition)

Ms - Hys > Thresh

The variables in the formula are defined as follows:

Ms is the measurement result of the serving cell, not taking into account any offsets.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigNR for this event).

Thresh is the threshold parameter for this event (i.e. a2-Threshold as defined within reportConfigNR for this event).

Ms is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Hys is expressed in dB.

Thresh is expressed in the same unit as Ms.

5.5.4.4 Event A3 (Neighbour becomes offset better than SpCell)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A3-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A3-2, as specified below, is fulfilled;

1> use the SpCell for *Mp*, *Ofp and Ocp*.

NOTE 1: The cell(s) that triggers the event has reference signals indicated in the *measObjectNR* associated to this event which may be different from the NR SpCell *measObjectNR*.

Inequality A3-1 (Entering condition)

$$Mn + Ofn + Ocn - Hys > Mp + Ofp + Ocp + Off$$

Inequality A3-2 (Leaving condition)

$$Mn + Ofn + Ocn + Hys < Mp + Ofp + Ocp + Off$$

The variables in the formula are defined as follows:

Mn is the measurement result of the neighbouring cell, not taking into account any offsets.

Ofn is the measurement object specific offset of the reference signal of the neighbour cell (i.e. *offsetMO* as defined within *measObjectNR* corresponding to the neighbour cell).

Ocn is the cell specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within *measObjectNR* corresponding to the frequency of the neighbour cell), and set to zero if not configured for the neighbour cell.

Mp is the measurement result of the SpCell, not taking into account any offsets.

Ofp is the measurement object specific offset of the SpCell (i.e. *offsetMO* as defined within *measObjectNR* corresponding to the SpCell).

Ocp is the cell specific offset of the SpCell (i.e. *cellIndividualOffset* as defined within *measObjectNR* corresponding to the SpCell), and is set to zero if not configured for the SpCell.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigNR for this event).

Off is the offset parameter for this event (i.e. a3-Offset as defined within reportConfigNR for this event).

Mn, Mp are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Ofn, Ocn, Ofp, Ocp, Hys, Off are expressed in dB.

NOTE 2: The definition of Event A3 also applies to CondEvent A3.

5.5.4.5 Event A4 (Neighbour becomes better than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A4-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A4-2, as specified below, is fulfilled.

Inequality A4-1 (Entering condition)

$$Mn + Ofn + Ocn - Hys > Thresh$$

Inequality A4-2 (Leaving condition)

$$Mn + Ofn + Ocn + Hys < Thresh$$

The variables in the formula are defined as follows:

Mn is the measurement result of the neighbouring cell, not taking into account any offsets.

Ofn is the measurement object specific offset of the neighbour cell (i.e. *offsetMO* as defined within *measObjectNR* corresponding to the neighbour cell).

Ocn is the measurement object specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within *measObjectNR* corresponding to the neighbour cell), and set to zero if not configured for the neighbour cell.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigNR for this event).

Thresh is the threshold parameter for this event (i.e. a4-Threshold as defined within reportConfigNR for this event).

Mn is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Ofn, Ocn, Hys are expressed in dB.

Thresh is expressed in the same unit as **Mn**.

NOTE: The definition of Event A4 also applies to CondEvent A4.

5.5.4.6 Event A5 (SpCell becomes worse than threshold1 and neighbour becomes better than threshold2)

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition A5-1 and condition A5-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A5-3 or condition A5-4, i.e. at least one of the two, as specified below, is fulfilled;

1> use the SpCell for Mp.

NOTE 1: The parameters of the reference signal(s) of the cell(s) that triggers the event are indicated in the *measObjectNR* associated to the event which may be different from the *measObjectNR* of the NR SpCell.

Inequality A5-1 (Entering condition 1)

Mp + Hys < Thresh1

Inequality A5-2 (Entering condition 2)

Mn + Ofn + Ocn - Hys > Thresh2

Inequality A5-3 (Leaving condition 1)

Mp - Hys > Thresh1

Inequality A5-4 (Leaving condition 2)

Mn + Ofn + Ocn + Hys < Thresh2

The variables in the formula are defined as follows:

Mp is the measurement result of the NR SpCell, not taking into account any offsets.

Mn is the measurement result of the neighbouring cell, not taking into account any offsets.

Ofn is the measurement object specific offset of the neighbour cell (i.e. *offsetMO* as defined within *measObjectNR* corresponding to the neighbour cell).

Ocn is the cell specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within *measObjectNR* corresponding to the neighbour cell), and set to zero if not configured for the neighbour cell.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigNR for this event).

Thresh1 is the threshold parameter for this event (i.e. *a5-Threshold1* as defined within *reportConfigNR* for this event).

Thresh2 is the threshold parameter for this event (i.e. *a5-Threshold2* as defined within *reportConfigNR* for this event).

Mn, Mp are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Ofn, Ocn, Hys are expressed in dB.

Thresh1 is expressed in the same unit as *Mp*.

Thresh2 is expressed in the same unit as *Mn*.

NOTE 2: The definition of Event A5 also applies to CondEvent A5.

5.5.4.7 Event A6 (Neighbour becomes offset better than SCell)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A6-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A6-2, as specified below, is fulfilled;

1> for this measurement, consider the (secondary) cell corresponding to the *measObjectNR* associated to this event to be the serving cell.

NOTE: The reference signal(s) of the neighbour(s) and the reference signal(s) of the SCell are both indicated in the associated *measObjectNR*.

Inequality A6-1 (Entering condition)

Mn + Ocn - Hys > Ms + Ocs + Off

Inequality A6-2 (Leaving condition)

$$Mn + Ocn + Hys < Ms + Ocs + Off$$

The variables in the formula are defined as follows:

Mn is the measurement result of the neighbouring cell, not taking into account any offsets.

Ocn is the cell specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within the associated *measObjectNR*), and set to zero if not configured for the neighbour cell.

Ms is the measurement result of the serving cell, not taking into account any offsets.

Ocs is the cell specific offset of the serving cell (i.e. *cellIndividualOffset* as defined within the associated *measObjectNR*), and is set to zero if not configured for the serving cell.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigNR for this event).

Off is the offset parameter for this event (i.e. a6-Offset as defined within reportConfigNR for this event).

Mn, Ms are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Ocn, Ocs, Hys, Off are expressed in dB.

5.5.4.8 Event B1 (Inter RAT neighbour becomes better than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition B1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition B1-2, as specified below, is fulfilled.

Inequality B1-1 (Entering condition)

Mn + Ofn + Ocn - Hys > Thresh

Inequality B1-2 (Leaving condition)

Mn + Ofn + Ocn + Hys < Thresh

The variables in the formula are defined as follows:

Mn is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets.

Ofn is the measurement object specific offset of the frequency of the inter-RAT neighbour cell (i.e. eutra-Q-OffsetRange as defined within the measObjectEUTRA corresponding to the frequency of the neighbour inter-RAT cell, utra-FDD-Q-OffsetRange as defined within the measObjectUTRA-FDD corresponding to the frequency of the neighbour inter-RAT cell).

Ocn is the cell specific offset of the inter-RAT neighbour cell (i.e. cellIndividualOffset as defined within the measObjectEUTRA corresponding to the neighbour inter-RAT cell), and set to zero if not configured for the neighbour cell.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigInterRAT for this event).

Thresh is the threshold parameter for this event (i.e. b1-ThresholdEUTRA as defined within reportConfigInterRAT for this event, b1-ThresholdUTRA-FDD as defined for UTRA-FDD within reportConfigInterRAT for this event).

Mn is expressed in dBm or in dB, depending on the measurement quantity of the inter-RAT neighbour cell.

Ofn, Ocn, Hys are expressed in dB.

Thresh is expressed in the same unit as **Mn**.

5.5.4.9 Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2)

The UE shall:

- 1> consider the entering condition for this event to be satisfied when both condition B2-1 and condition B2-2, as specified below, are fulfilled;
- 1> consider the leaving condition for this event to be satisfied when condition B2-3 or condition B2-4, i.e. at least one of the two, as specified below, is fulfilled;

Inequality B2-1 (Entering condition 1)

Mp + Hys < Thresh1

Inequality B2-2 (Entering condition 2)

Mn + Ofn + Ocn - Hys > Thresh2

Inequality B2-3 (Leaving condition 1)

Mp - Hys > Thresh1

Inequality B2-4 (Leaving condition 2)

Mn + Ofn + Ocn + Hys < Thresh2

The variables in the formula are defined as follows:

Mp is the measurement result of the PCell, not taking into account any offsets.

Mn is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets.

Ofn is the measurement object specific offset of the frequency of the inter-RAT neighbour cell (i.e. eutra-Q-OffsetRange as defined within the measObjectEUTRA corresponding to the frequency of the inter-RAT

neighbour cell, *utra-FDD-Q-OffsetRange* as defined within the *measObjectUTRA-FDD* corresponding to the frequency of the neighbour inter-RAT cell).

Ocn is the cell specific offset of the inter-RAT neighbour cell (i.e. cellIndividualOffset as defined within the measObjectEUTRA corresponding to the neighbour inter-RAT cell), and set to zero if not configured for the neighbour cell.

Hys is the hysteresis parameter for this event (i.e. *hysteresis* as defined within *reportConfigInterRAT* for this event).

Thresh1 is the threshold parameter for this event (i.e. b2-*Threshold1* as defined within *reportConfigInterRAT* for this event).

Thresh2 is the threshold parameter for this event (i.e. *b2-Threshold2EUTRA* as defined within *reportConfigInterRAT* for this event, *b2-Threshold2UTRA-FDD* as defined for UTRA-FDD within *reportConfigInterRAT* for this event).

Mp is expressed in dBm in case of RSRP, or in dB in case of RSRQ and SINR.

Mn is expressed in dBm or dB, depending on the measurement quantity of the inter-RAT neighbour cell.

Ofn, Ocn, Hys are expressed in dB.

Thresh1 is expressed in the same unit as *Mp*.

Thresh2 is expressed in the same unit as *Mn*.

5.5.4.10 Event I1 (Interference becomes higher than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition I1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition I1-2, as specified below, is fulfilled.

Inequality I1-1 (Entering condition)

Mi - Hys > Thresh

Inequality I1-2 (Leaving condition)

Mi + Hys < Thresh

The variables in the formula are defined as follows:

Mi is the measurement result of the interference, not taking into account any offsets.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigNR for this event).

Thresh is the threshold parameter for this event (i.e. *i1-Threshold* as defined within *reportConfigNR* for this event).

Mi, Thresh are expressed in dBm.

Hys is expressed in dB.

5.5.4.11 Event C1 (The NR sidelink channel busy ratio is above a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition C1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition C1-2, as specified below, is fulfilled;

Inequality C1-1 (Entering condition)

Ms - Hys > Thresh

Inequality C1-2 (Leaving condition)

Ms + Hys < Thresh

The variables in the formula are defined as follows:

Ms is the measurement result of channel busy ratio of the transmission resource pool, not taking into account any offsets.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigNR-SL for this event).

Thresh is the threshold parameter for this event (i.e. *c1-Threshold* as defined within *reportConfigNR-SL* for this event).

Ms is expressed in decimal from 0 to 1 in steps of 0.01.

Hys is expressed is in the same unit as Ms.

Thresh is expressed in the same unit as *Ms*.

5.5.4.12 Event C2 (The NR sidelink channel busy ratio is below a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition C2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition C2-2, as specified below, is fulfilled;

Inequality C2-1 (Entering condition)

Ms + Hys < Thresh

Inequality C2-2 (Leaving condition)

Ms-Hys>Thresh

The variables in the formula are defined as follows:

Ms is the measurement result of channel busy ratio of the transmission resource pool, not taking into account any offsets.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigNR-SL for this event).

Thresh is the threshold parameter for this event (i.e. *c2-Threshold* as defined within *reportConfigNR-SL* for this event).

Ms is expressed in decimal from 0 to 1 in steps of 0.01.

Hys is expressed is in the same unit as *Ms*.

Thresh is expressed in the same unit as **Ms**.

5.5.4.13 Void

5.5.4.14 Void

5.5.4.15 Event D1 (Distance between UE and referenceLocation1 is above threshold1 and distance between UE and referenceLocation2 is below threshold2)

- 1> consider the entering condition for this event to be satisfied when both condition D1-1 and condition D1-2, as specified below, are fulfilled;
- 1> consider the leaving condition for this event to be satisfied when condition D1-3 or condition D1-4, i.e. at least one of the two, as specified below, are fulfilled;

Inequality D1-1 (Entering condition 1)

Ml1 - Hys > Thresh1

Inequality D1-2 (Entering condition 2)

Ml2 + Hys < Thresh2

Inequality D1-3 (Leaving condition 1)

Ml1 + Hys < Thresh1

Inequality D1-4 (Leaving condition 2)

Ml2 - Hys > Thresh2

The variables in the formula are defined as follows:

Ml1 is the UE location, represented by the distance between UE and a reference location parameter for this event (i.e. *referenceLocation1* as defined within *reportConfigNR* for this event), not taking into account any offsets.

Ml2 is the UE location, represented by the distance between UE and a reference location parameter for this event (i.e. *referenceLocation2* as defined within *reportConfigNR* for this event), not taking into account any offsets.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigNR for this event).

Thresh1 is the threshold for this event defined as a distance, configured with parameter distanceThreshFromReference1, from a reference location configured with parameter referenceLocation1 within reportConfigNR for this event.

Thresh2 is the threshold for this event defined as a distance, configured with parameter *distanceThreshFromReference2*, from a reference location configured with parameter *referenceLocation2* within *reportConfigNR* for this event.

Ml1 is expressed in meters.

Ml2 is expressed in the same unit as *Ml1*.

Hys is expressed in the same unit as Ml1.

Thresh1 is expressed in the same unit as Ml1.

Thresh2 is expressed in the same unit as *Ml1*.

NOTE: The definition of Event D1 also applies to CondEvent D1.

5.5.4.16 CondEvent T1 (Time measured at UE is within a duration from threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition T1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition T1-2, as specified below, is fulfilled;

Inequality T1-1 (Entering condition)

Mt > Thresh1

Inequality T1-2 (Leaving condition)

Mt > Thresh1 + Duration

The variables in the formula are defined as follows:

Mt is the time measured at UE.

Thresh1 is the threshold parameter for this event (i.e. *t1-Threshold* as defined within *reportConfigNR* for this event).

Duration is the duration parameter for this event (i.e. duration as defined within reportConfigNR for this event).

Mt is expressed in *ms*.

Thresh1 is expressed in the same unit as *Mt*.

Duration is expressed in the same unit as **Mt**.

5.5.4.17 Event X1 (Serving L2 U2N Relay UE becomes worse than threshold1 and NR Cell becomes better than threshold2)

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition X1-1 and condition X1-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition X1-3 or condition X1-4, i.e. at least one of the two, as specified below, is fulfilled;

Inequality X1-1 (Entering condition 1)

Mr + Hys < Thresh1

Inequality X1-2 (Entering condition 2)

Mn + Ofn + Ocn - Hys > Thresh2

Inequality X1-3 (Leaving condition 1)

Mr - Hys > Thresh1

Inequality X1-4 (Leaving condition 2)

Mn + Ofn + Ocn + Hys < Thresh2

The variables in the formula are defined as follows:

Mr is the measurement result of the serving L2 U2N Relay UE, not taking into account any offsets.

Mn is the measurement result of the NR cell, not taking into account any offsets.

Ofn is the measurement object specific offset of the reference signal of the NR cell (i.e. *offsetMO* as defined within *measObjectNR* corresponding to the NR cell).

Ocn is the cell specific offset of the NR cell (i.e. *cellIndividualOffset* as defined within *measObjectNR* corresponding to the frequency of the NR cell), and set to zero if not configured for the cell.

Hys is the hysteresis parameter for this event.

Thresh1 is the threshold parameter for this event (i.e. *x1-Threshold1-Relay* as defined within *reportConfigNR* for this event).

Thresh2 is the threshold parameter for this event (i.e. *x1-Threshold2* as defined within *reportConfigNR* for this event).

Mr is expressed in dBm.

Mn is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Ofn, Ocn, Hys are expressed in dB.

Thresh1 is expressed in the same unit as *Mr*.

Thresh2 is expressed in the same unit as Mn.

5.5.4.18 Event X2 (Serving L2 U2N Relay UE becomes worse than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition X2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition X2-2, as specified below, is fulfilled;

Inequality X2-1 (Entering condition)

Mr + Hys < Thresh

Inequality X2-2 (Leaving condition)

Mr - Hys > Thresh

The variables in the formula are defined as follows:

Mr is the measurement result of the serving L2 U2N Relay UE, not taking into account any offsets.

Hys is the hysteresis parameter for this event.

Thresh is the threshold parameter for this event (i.e. x2-Threshold-Relay as defined within reportConfigNR for this event).

Mr is expressed in dBm.

Hys are expressed in dB.

Thresh is expressed in the same unit as *Mr*.

5.5.4.19 Event Y1 (PCell becomes worse than threshold1 and candidate L2 U2N Relay UE becomes better than threshold2)

The UE shall:

- 1> consider the entering condition for this event to be satisfied when both condition Y1-1 and condition Y1-2, as specified below, are fulfilled;
- 1> consider the leaving condition for this event to be satisfied when condition Y1-3 or condition Y1-4, i.e. at least one of the two, as specified below, is fulfilled;

Inequality Y1-1 (Entering condition 1)

Mp + Hys < Thresh1

Inequality Y1-2 (Entering condition 2)

Mr-Hys > Thresh2

Inequality Y1-3 (Leaving condition 1)

Mp - Hys > Thresh1

Inequality Y1-4 (Leaving condition 2)

Mr + Hys < Thresh2

The variables in the formula are defined as follows:

Mp is the measurement result of the PCell, not taking into account any offsets.

Mr is the measurement result of the candidate L2 U2N Relay UE, not taking into account any offsets.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigInterRAT for this event).

Thresh1 is the threshold parameter for this event (i.e. *y1-Threshold1* as defined within *reportConfigInterRAT* for this event).

Thresh2 is the threshold parameter for this event (i.e. *y1-Threshold2-Relay* as defined within *reportConfigInterRAT* for this event).

Mp is expressed in dBm in case of RSRP, or in dB in case of RSRQ and SINR.

Mr is expressed in dBm or dB, depending on the measurement quantity of candidate L2 U2N Relay UE.

Hys are expressed in dB.

Thresh1 is expressed in the same unit as *Mp*.

Thresh2 is expressed in the same unit as *Mr*.

5.5.4.20 Event Y2 (Candidate L2 U2N Relay UE becomes better than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition Y2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition Y2-2, as specified below, is fulfilled;

Inequality Y2-1 (Entering condition)

Mr– Hys > Thresh2

Inequality Y2-2 (Leaving condition)

Mr + Hys < Thresh2

The variables in the formula are defined as follows:

Mr is the measurement result of the candidate L2 U2N Relay UE, not taking into account any offsets.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigInterRAT for this event).

Thresh is the threshold parameter for this event (i.e. y2-Threshold-Relay as defined within reportConfigInterRAT for this event).

Mr is expressed in dBm or dB, depending on the measurement quantity of candidate L2 U2N Relay UE.

Hys are expressed in dB.

Thresh is expressed in the same unit as *Mr*.

5.5.5 Measurement reporting

5.5.5.1 General



Figure 5.5.5.1-1: Measurement reporting

The purpose of this procedure is to transfer measurement results from the UE to the network. The UE shall initiate this procedure only after successful AS security activation.

For the *measId* for which the measurement reporting procedure was triggered, the UE shall set the *measResults* within the *MeasurementReport* message as follows:

- 1> set the *measId* to the measurement identity that triggered the measurement reporting;
- 1> for each serving cell configured with *servingCellMO*:
 - 2> if the reportConfig associated with the measId that triggered the measurement reporting includes rsType:
 - 3> if the serving cell measurements based on the *rsType* included in the *reportConfig* that triggered the measurement report are available:
 - 4> set the *measResultServingCell* within *measResultServingMOList* to include RSRP, RSRQ and the available SINR of the serving cell, derived based on the *rsType* included in the *reportConfig* that triggered the measurement report;

- 3> if SSB based serving cell measurements are available:
 - 4> set the *measResultServingCell* within *measResultServingMOList* to include RSRP, RSRQ and the available SINR of the serving cell, derived based on SSB;
- 3> else if CSI-RS based serving cell measurements are available:
 - 4> set the *measResultServingCell* within *measResultServingMOList* to include RSRP, RSRQ and the available SINR of the serving cell, derived based on CSI-RS;
- 1> set the *servCellId* within *measResultServingMOList* to include each NR serving cell that is configured with *servingCellMO*, if any;
- 1> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport*:
 - 2> for each serving cell configured with *servingCellMO*, include beam measurement information according to the associated *reportConfig* as described in 5.5.5.2;
- 1> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportAddNeighMeas*:
 - 2> for each *measObjectId* referenced in the *measIdList* which is also referenced with *servingCellMO*, other than the *measObjectId* corresponding with the *measId* that triggered the measurement reporting:
 - 3> if the *measObjectNR* indicated by the *servingCellMO* includes the RS resource configuration corresponding to the *rsType* indicated in the *reportConfig*:
 - 4> set the measResultBestNeighCell within measResultServingMOList to include the physCellId and the available measurement quantities based on the reportQuantityCell and rsType indicated in reportConfig of the non-serving cell corresponding to the concerned measObjectNR with the highest measured RSRP if RSRP measurement results are available for cells corresponding to this measObjectNR, otherwise with the highest measured RSRQ if RSRQ measurement results are available for cells corresponding to this measObjectNR, otherwise with the highest measured SINR;
 - 4> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport*:
 - 5> for each best non-serving cell included in the measurement report:
 - 6> include beam measurement information according to the associated *reportConfig* as described in 5.5.5.2;
- 1> if the *reportConfig* associated with the *measId* that triggered the measurement reporting is set to *eventTriggered* and *eventID* is set to *eventA3*, or *eventA4*, or *eventA5*, or *eventB1*, or *eventB2*:
 - 2> if the UE is in NE-DC and the measurement configuration that triggered this measurement report is associated with the MCG:

- 3> set the *measResultServFreqListEUTRA-SCG* to include an entry for each E-UTRA SCG serving frequency with the following:
 - 4> include *carrierFreq* of the E-UTRA serving frequency;
 - 4> set the *measResultServingCell* to include the available measurement quantities that the UE is configured to measure by the measurement configuration associated with the SCG;
 - 4> if *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportAddNeighMeas*:
 - 5> set the *measResultServFreqListEUTRA-SCG* to include within *measResultBestNeighCell* the quantities of the best non-serving cell, based on RSRP, on the concerned serving frequency;
- 1> if reportConfig associated with the measId that triggered the measurement reporting is set to eventTriggered and eventID is set to eventA3, or eventA4, or eventA5:
 - 2> if the UE is in NR-DC and the measurement configuration that triggered this measurement report is associated with the MCG:
 - 3> set the *measResultServFreqListNR-SCG* to include for each NR SCG serving cell that is configured with *servingCellMO*, if any, the following:
 - 4> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *rsType*:
 - 5> if the serving cell measurements based on the *rsType* included in the *reportConfig* that triggered the measurement report are available according to the measurement configuration associated with the SCG:
 - 6> set the *measResultServingCell* within *measResultServFreqListNR-SCG* to include RSRP, RSRQ and the available SINR of the serving cell, derived based on the *rsType* included in the *reportConfig* that triggered the measurement report;

- 5> if SSB based serving cell measurements are available according to the measurement configuration associated with the SCG:
 - 6> set the *measResultServingCell* within *measResultServFreqListNR-SCG* to include RSRP, RSRQ and the available SINR of the serving cell, derived based on SSB;
- 5> else if CSI-RS based serving cell measurements are available according to the measurement configuration associated with the SCG:
 - 6> set the *measResultServingCell* within *measResultServFreqListNR-SCG* to include RSRP, RSRQ and the available SINR of the serving cell, derived based on CSI-RS;
- 4> if results for the serving cell derived based on SSB are included:
 - 5> include the *ssbFrequency* to the value indicated by ssbFrequency as included in the *MeasObjectNR* of the serving cell;
- 4> if results for the serving cell derived based on CSI-RS are included:
 - 5> include the *refFreqCSI-RS* to the value indicated by *refFreqCSI-RS* as included in the *MeasObjectNR* of the serving cell;
- 4> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport*:
 - 5> for each serving cell configured with *servingCellMO*, include beam measurement information according to the associated *reportConfig* as described in 5.5.5.2, where availability is considered according to the measurement configuration associated with the SCG;

- 4> if *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportAddNeighMeas*:
 - 5> if the *measObjectNR* indicated by the *servingCellMO* includes the RS resource configuration corresponding to the *rsType* indicated in the *reportConfig*:
 - 6> set the measResultNeighCellListNR within measResultServFreqListNR-SCG to include one entry with the physCellId and the available measurement quantities based on the reportQuantityCell and rsType indicated in reportConfig of the non-serving cell corresponding to the concerned measObjectNR with the highest measured RSRP if RSRP measurement results are available for cells corresponding to this measObjectNR, otherwise with the highest measured RSRQ if RSRQ measurement results are available for cells corresponding to this measObjectNR, otherwise with the highest measured SINR, where availability is considered according to the measurement configuration associated with the SCG;
 - 7> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport*:
 - 8> for each best non-serving cell included in the measurement report:
 - 9> include beam measurement information according to the associated reportConfig as described in 5.5.5.2, where availability is considered according to the measurement configuration associated with the SCG;
- 1> if the measRSSI-ReportConfig is configured within the corresponding reportConfig for this measId:
 - 2> set the rssi-Result to the linear average of sample value(s) provided by lower layers in the reportInterval;
 - 2> set the *channelOccupancy* to the rounded percentage of sample values which are beyond the *channelOccupancyThreshold* within all the sample values in the *reportInterval*;
- 1> if the UE is acting as L2 U2N Remote UE:
 - 2> set the sl-MeasResultServingRelay in accordance with the following:
 - 3> set the *cellIdentity* to include the *cellAccessRelatedInfo* contained in the discovery message received from the serving L2 U2N Relay UE;
 - 3> set the *sl-RelayUE-Identity* to include the Source L2 ID of the serving L2 U2N Relay;
 - 3> set the *sl-MeasResult* to include the SL-RSRP of the serving L2 U2N Relay UE;
- NOTE 1: In case of no data transmission from L2 U2N Relay UE to L2 U2N Remote UE, it is left to UE implementation whether to use SL-RSRP or SD-RSRP when setting the *sl-MeasResultServingRelay* of the serving L2 U2N Relay UE.
- 1> if there is at least one applicable neighbouring cell or candidate L2 U2N Relay UE to report:
 - 2> if the reportType is set to eventTriggered or periodical:
 - 3> if the measurement report concerns the candidate L2 U2N Relay UE:
 - 4> set the *sl-MeasResultsCandRelay* in *measResultNeighCells* to include the best candidate L2 U2N Relay UEs up to *maxReportCells* in accordance with the following:
 - 5> if the *reportType* is set to *eventTriggered*:
 - 6> include the L2 U2N Relay UEs included in the *relaysTriggeredList* as defined within the *VarMeasReportList* for this *measId*;
 - 5> else:
 - 6> include the applicable L2 U2N Relay UEs for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;
 - 5> for each L2 U2N Relay UE that is included in the *sl-MeasResultsCandRelay*:

- 6> set the *cellIdentity* to include the *cellAccessRelatedInfo* contained in the discovery message received from the concerned L2 U2N Relay UE;
- 6> set the sl-RelayUE-Identity to include the Source L2 ID of the concerned L2 U2N Relay UE;
- 6> set the sl-MeasResult to include the SD-RSRP of the concerned L2 U2N Relay UE;
- 5> for each included L2 U2N Relay UE, include the layer 3 filtered measured results in accordance with the *reportConfig* for this *measId*, ordered as follows:
 - 6> set the *sl-MeasResult* to include the quantity(ies) indicated in the *reportQuantityRelay* within the concerned *reportConfigRelay* in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best L2 U2N Relay UE is included first;

- 4> set the *measResultNeighCells* to include the best neighbouring cells up to *maxReportCells* in accordance with the following:
 - 5> if the *reportType* is set to *eventTriggered* and *eventId* is not set to *eventD1*:
 - 6> include the cells included in the *cellsTriggeredList* as defined within the *VarMeasReportList* for this *measId*;
 - 5> else:
 - 6> include the applicable cells for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;
 - 5> for each cell that is included in the *measResultNeighCells*, include the *physCellId*;
 - 5> if the reportType is set to eventTriggered or periodical:
 - 6> for each included cell, include the layer 3 filtered measured results in accordance with the *reportConfig* for this *measId*, ordered as follows:
 - 7> if the *measObject* associated with this *measId* concerns NR:
 - 8> if *rsType* in the associated *reportConfig* is set to *ssb*:
 - 9> set *resultsSSB-Cell* within the *measResult* to include the SS/PBCH block based quantity(ies) indicated in the *reportQuantityCell* within the concerned *reportConfig*, in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first;
 - 9> if reportQuantityRS-Indexes and maxNrofRS-IndexesToReport are configured, include beam measurement information as described in 5.5.5.2;
 - 8> else if rsType in the associated reportConfig is set to csi-rs:
 - 9> set results CSI-RS-Cell within the meas Result to include the CSI-RS based quantity (ies) indicated in the report Quantity Cell within the concerned report Config, in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first;
 - 9> if reportQuantityRS-Indexes and maxNrofRS-IndexesToReport are configured, include beam measurement information as described in 5.5.5.2;
 - 7> if the *measObject* associated with this *measId* concerns E-UTRA:
 - 8> set the *measResult* to include the quantity(ies) indicated in the *reportQuantity* within the concerned *reportConfigInterRAT* in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first;
 - 7> if the *measObject* associated with this *measId* concerns UTRA-FDD and if *ReportConfigInterRAT* includes the *reportQuantityUTRA-FDD*:

8> set the *measResult* to include the quantity(ies) indicated in the *reportQuantityUTRA-FDD* within the concerned *reportConfigInterRAT* in decreasing order of the sorting quantity, determined as specified in 5.5.5.3, i.e. the best cell is included first;

2> else:

- 3> if the cell indicated by cellForWhichToReportCGI is an NR cell:
 - 4> if *plmn-IdentityInfoList* of the *cgi-Info* for the concerned cell has been obtained:
 - 5> include the *plmn-IdentityInfoList* including *plmn-IdentityList*, *trackingAreaCode* (if available), *trackingAreaList* (if available), *ranac* (if available), *cellIdentity* and *cellReservedForOperatorUse* for each entry of the *plmn-IdentityInfoList*;
 - 5> include *frequencyBandList* if available;
 - 5> for each *PLMN-IdentityInfo* in *plmn-IdentityInfoList*:
 - 6> if the *gNB-ID-Length* is broadcast:
 - 7> include gNB-ID-Length;
 - 4> if *nr-CGI-Reporting-NPN* is supported by the UE and *npn-IdentityInfoList* of the *cgi-Info* for the concerned cell has been obtained:
 - 5> include the *npn-IdentityInfoList* including *npn-IdentityList*, *trackingAreaCode*, *ranac* (if available), *cellIdentity* and *cellReservedForOperatorUse* for each entry of the *npn-IdentityInfoList*;
 - 5> for each NPN-IdentityInfo in NPN-IdentityInfoList:
 - 6> if the *gNB-ID-Length* is broadcast:
 - 7> include gNB-ID-Length;
 - 5> include *cellReservedForOtherUse* if available;
 - 4> else if MIB indicates the SIB1 is not broadcast:
 - 5> include the *noSIB1* including the *ssb-SubcarrierOffset* and *pdcch-ConfigSIB1* obtained from *MIB* of the concerned cell;
- 3> if the cell indicated by *cellForWhichToReportCGI* is an E-UTRA cell:
 - 4> if all mandatory fields of the cgi-Info-EPC for the concerned cell have been obtained:
 - 5> include in the *cgi-Info-EPC* the fields broadcasted in E-UTRA *SystemInformationBlockType1* associated to EPC;
 - 4> if the UE is E-UTRA/5GC capable and all mandatory fields of the *cgi-Info-5GC* for the concerned cell have been obtained:
 - 5> include in the *cgi-Info-5GC* the fields broadcasted in E-UTRA *SystemInformationBlockType1* associated to 5GC;
 - 4> if the mandatory present fields of the *cgi-Info* for the cell indicated by the *cellForWhichToReportCGI* in the associated *measObject* have been obtained:
 - 5> include the *freqBandIndicator*;
 - 5> if the cell broadcasts the *multiBandInfoList*, include the *multiBandInfoList*;
 - 5> if the cell broadcasts the *freqBandIndicatorPriority*, include the *freqBandIndicatorPriority*;
- 1> if the corresponding *measObject* concerns NR:
 - 2> if the reportSFTD-Meas is set to true within the corresponding reportConfigNR for this measId:
 - 3> set the measResultSFTD-NR in accordance with the following:

- 4> set sfn-OffsetResult and frameBoundaryOffsetResult to the measurement results provided by lower layers;
- 4> if the reportRSRP is set to true;
 - 5> set rsrp-Result to the RSRP of the NR PSCell derived based on SSB;
- 2> else if the reportSFTD-NeighMeas is included within the corresponding reportConfigNR for this measId:
 - 3> for each applicable cell which measurement results are available, include an entry in the *measResultCellListSFTD-NR* and set the contents as follows:
 - 4> set *physCellId* to the physical cell identity of the concerned NR neighbour cell.
 - 4> set *sfn-OffsetResult* and *frameBoundaryOffsetResult* to the measurement results provided by lower layers;
 - 4> if the *reportRSRP* is set to *true*:
 - 5> set rsrp-Result to the RSRP of the concerned cell derived based on SSB;
- 1> else if the corresponding *measObject* concerns E-UTRA:
 - 2> if the reportSFTD-Meas is set to true within the corresponding reportConfigInterRAT for this measId:
 - 3> set the *measResultSFTD-EUTRA* in accordance with the following:
 - 4> set *sfn-OffsetResult* and *frameBoundaryOffsetResult* to the measurement results provided by lower layers;
 - 4> if the *reportRSRP* is set to *true*;
 - 5> set *rsrpResult-EUTRA* to the RSRP of the EUTRA PSCell;
- 1> if average uplink PDCP delay values are available:
 - 2> set the ul-PDCP-DelayValueResultList to include the corresponding average uplink PDCP delay values;
- 1> if PDCP excess delay measurements are available:
 - 2> set the *ul-PDCP-ExcessDelayResultList* to include the corresponding PDCP excess delay measurements;
- 1> if the *includeCommonLocationInfo* is configured in the corresponding *reportConfig* for this *measId* and detailed location information that has not been reported is available, set the content of *commonLocationInfo* of the *locationInfo* as follows:
 - 2> include the *locationTimestamp*;
 - 2> include the *locationCoordinate*, if available;
 - 2> include the *velocityEstimate*, if available;
 - 2> include the *locationError*, if available;
 - 2> include the *locationSource*, if available;
 - 2> if available, include the gnss-TOD-msec,
- 1> if the coarseLocationRequest is set to true in the corresponding reportConfig for this measId:
 - 2> include coarseLocationInfo, if available;
- 1> if the *includeWLAN-Meas* is configured in the corresponding *reportConfig* for this *measId*, set the *wlan-LocationInfo* of the *locationInfo* in the *measResults* as follows:
 - 2> if available, include the LogMeasResultWLAN, in order of decreasing RSSI for WLAN APs;

- 1> if the *includeBT-Meas* is configured in the corresponding *reportConfig* for this *measId*, set the *BT-LocationInfo* of the *locationInfo* in the *measResults* as follows:
 - 2> if available, include the *LogMeasResultBT*, in order of decreasing RSSI for Bluetooth beacons;
- 1> if the *includeSensor-Meas* is configured in the corresponding *reportConfig* for this *measId*, set the *sensor-LocationInfo* of the *locationInfo* in the *measResults* as follows:
 - 2> if available, include the *sensor-MeasurementInformation*;
 - 2> if available, include the *sensor-MotionInformation*;
- 1> if there is at least one applicable transmission resource pool for NR sidelink communication/discovery (for *measResultsSL*):
 - 2> set the measResultsListSL to include the CBR measurement results in accordance with the following:
 - 3> if the *reportType* is set to *eventTriggered*:
 - 4> include the transmission resource pools included in the *poolsTriggeredList* as defined within the *VarMeasReportList* for this *measId*;
 - 3> else:
 - 4> include the applicable transmission resource pools for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;
 - 3> if the corresponding *measObject* concerns NR sidelink communication/discovery, then for each transmission resource pool to be reported:
 - 4> set the *sl-poolReportIdentity* to the identity of this transmission resource pool;
 - 4> set the *sl-CBR-ResultsNR* to the CBR measurement results on PSSCH and PSCCH of this transmission resource pool provided by lower layers, if available;

NOTE 1: Void.

- 1> if there is at least one applicable CLI measurement resource to report:
 - 2> if the *reportType* is set to *cli-EventTriggered* or *cli-Periodical*:
 - 3> set the *measResultCLI* to include the most interfering SRS resources or most interfering CLI-RSSI resources up to *maxReportCLI* in accordance with the following:
 - 4> if the *reportType* is set to *cli-EventTriggered*:
 - 5> if trigger quantity is set to *srs-RSRP* i.e. *i1-Threshold* is set to *srs-RSRP*:
 - 6> include the SRS resource included in the *cli-TriggeredList* as defined within the *VarMeasReportList* for this *measId*;
 - 5> if trigger quantity is set to *cli-RSSI* i.e. *i1-Threshold* is set to *cli-RSSI*:
 - 6> include the CLI-RSSI resource included in the *cli-TriggeredList* as defined within the *VarMeasReportList* for this *measId*;
 - 4> else:
 - 5> if reportQuantityCLI is set to srs-rsrp:
 - 6> include the applicable SRS resources for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;
 - 5> else:
 - 6> include the applicable CLI-RSSI resources for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;

- 4> for each SRS resource that is included in the *measResultCLI*:
 - 5> include the srs-ResourceId;
 - 5> set *srs-RSRP-Result* to include the layer 3 filtered measured results in decreasing order, i.e. the most interfering SRS resource is included first;
- 4> for each CLI-RSSI resource that is included in the *measResultCLI*:
 - 5> include the rssi-ResourceId;
 - 5> set *cli-RSSI-Result* to include the layer 3 filtered measured results in decreasing order, i.e. the most interfering CLI-RSSI resource is included first;
- 1> if there is at least one applicable UE Rx-Tx time difference measurement to report:
 - 2> set measResultRxTxTimeDiff to the latest measurement result;
- 1> increment the numberOfReportsSent as defined within the VarMeasReportList for this measId by 1;
- 1> stop the periodical reporting timer, if running;
- 1> if the *numberOfReportsSent* as defined within the *VarMeasReportList* for this *measId* is less than the *reportAmount* as defined within the corresponding *reportConfig* for this *measId*:
 - 2> start the periodical reporting timer with the value of *reportInterval* as defined within the corresponding *reportConfig* for this *measId*;

1> else:

- 2> if the *reportType* is set to *periodical* or *cli-Periodical* or *rxTxPeriodical*:
 - 3> remove the entry within the *VarMeasReportList* for this *measId*;
 - 3> remove this *measId* from the *measIdList* within *VarMeasConfig*;
- 1> if the measurement reporting was configured by a *sl-ConfigDedicatedNR* received within the *RRCConnectionReconfiguration*:
 - 2> submit the *MeasurementReport* message to lower layers for transmission via SRB1, embedded in E-UTRA RRC message *ULInformationTransferIRAT* as specified TS 36.331 [10], clause 5.6.28;
- 1> else if the UE is in (NG)EN-DC:
 - 2> if SRB3 is configured and the SCG is not deactivated:
 - 3> submit the *MeasurementReport* message via SRB3 to lower layers for transmission, upon which the procedure ends;
 - 2> else:
 - 3> submit the *MeasurementReport* message via E-UTRA embedded in E-UTRA RRC message *ULInformationTransferMRDC* as specified in TS 36.331 [10].
- 1> else if the UE is in NR-DC:
 - 2> if the measurement configuration that triggered this measurement report is associated with the SCG:
 - 3> if SRB3 is configured and the SCG is not deactivated:
 - 4> submit the *MeasurementReport* message via SRB3 to lower layers for transmission, upon which the procedure ends;
 - 3> else:
 - 4> submit the *MeasurementReport* message via SRB1 embedded in NR RRC message *ULInformationTransferMRDC* as specified in 5.7.2a.3;

- 2> else:
 - 3> submit the *MeasurementReport* message via SRB1 to lower layers for transmission, upon which the procedure ends;
- 1> else:
 - 2> submit the MeasurementReport message to lower layers for transmission, upon which the procedure ends.

5.5.5.2 Reporting of beam measurement information

For beam measurement information to be included in a measurement report the UE shall:

- 1> if reportType is set to eventTriggered:
 - 2> consider the trigger quantity as the sorting quantity if available, otherwise RSRP as sorting quantity if available, otherwise RSRQ as sorting quantity if available, otherwise SINR as sorting quantity;
- 1> if *reportType* is set to *periodical*:
 - 2> if a single reporting quantity is set to true in reportQuantityRS-Indexes;
 - 3> consider the configured single quantity as the sorting quantity;
 - 2> else:
 - 3> if *rsrp* is set to *true*;
 - 4> consider RSRP as the sorting quantity;
 - 3> else:
 - 4> consider RSRQ as the sorting quantity;
- 1> set *rsIndexResults* to include up to *maxNrofRS-IndexesToReport* SS/PBCH block indexes or CSI-RS indexes in order of decreasing sorting quantity as follows:
 - 2> if the measurement information to be included is based on SS/PBCH block:
 - 3> include within *resultsSSB-Indexes* the index associated to the best beam for that SS/PBCH block sorting quantity and if *absThreshSS-BlocksConsolidation* is included in the *VarMeasConfig* for the *measObject* associated to the cell for which beams are to be reported, the remaining beams whose sorting quantity is above *absThreshSS-BlocksConsolidation*;
 - 3> if *includeBeamMeasurements* is set to *true*, include the SS/PBCH based measurement results for the quantities in *reportQuantityRS-Indexes* for each SS/PBCH block index;
 - 2> else if the beam measurement information to be included is based on CSI-RS:
 - 3> include within results CSI-RS-Indexes the index associated to the best beam for that CSI-RS sorting quantity and, if absThreshCSI-RS-Consolidation is included in the VarMeasConfig for the measObject associated to the cell for which beams are to be reported, the remaining beams whose sorting quantity is above absThreshCSI-RS-Consolidation;
 - 3> if *includeBeamMeasurements* is set to *true*, include the CSI-RS based measurement results for the quantities in *reportQuantityRS-Indexes* for each CSI-RS index.

5.5.5.3 Sorting of cell measurement results

The UE shall determine the sorting quantity according to parameters of the *reportConfig* associated with the *measId* that triggered the reporting:

- 1> if the reportType is set to eventTriggered:
 - 2> for an NR cell, consider the quantity used in the *aN-Threshold* (for *eventA1*, *eventA2* and *eventA4*) or in the *a5-Threshold2* (for *eventA5*) or in the *aN-Offset* (for *eventA3* and *eventA6*) as the sorting quantity;

- 2> for an E-UTRA cell, consider the quantity used in the bN-ThresholdEUTRA as the sorting quantity;
- 2> for an UTRA-FDD cell, consider the quantity used in the bN-ThresholdUTRA-FDD as the sorting quantity;
- 2> for a candidate L2 U2N Relay UE, consider the yN-Threshold2-Relay as the sorting quantity;
- 1> if the *reportType* is set to *periodical*:
 - 2> determine the sorting quantity according to *reportQuantityCell* for an NR cell, and according to *reportQuantity* for an E-UTRA cell, as below:
 - 3> if a single quantity is set to true:
 - 4> consider this quantity as the sorting quantity;
 - 3> else:
 - 4> if rsrp is set to true;
 - 5> consider RSRP as the sorting quantity;
 - 4> else:
 - 5> consider RSRQ as the sorting quantity;
 - 2> determine the sorting quantity according to reportQuantityUTRA-FDD for UTRA-FDD cell, as below:
 - 3> if a single quantity is set to *true*:
 - 4> consider this quantity as the sorting quantity;
 - 3> else:
 - 4> consider RSCP as the sorting quantity.
 - 2> for a candidate L2 U2N Relay UE, consider the reportQuantityRelay as the sorting quantity;

5.5.6 Location measurement indication

5.5.6.1 General

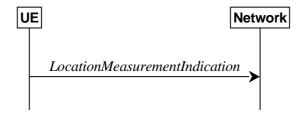


Figure 5.5.5.1-1: Location measurement indication

The purpose of this procedure is to indicate to the network that the UE is going to start/stop location related measurements towards E-UTRA or NR (*eutra-RSTD*, *nr-UE-RxTxTimeDiff*, *nr-PRS-RSRP*) which require measurement gaps or start/stop detection of subframe and slot timing towards E-UTRA (*eutra-FineTimingDetection*) which requires measurement gaps. UE shall initiate this procedure only after successful AS security activation.

NOTE: It is a network decision to configure the measurement gap.

5.5.6.2 Initiation

The UE shall:

- 1> if and only if upper layers indicate to start performing location measurements towards E-UTRA or NR or start subframe and slot timing detection towards E-UTRA, and the UE requires measurement gaps for these operations while measurement gaps are either not configured or not sufficient:
 - 2> if preconfigured measurement gaps for positioning are configured and the UE considers that at least one of the preconfigured measurement gaps for positioning is sufficient for the location measurement when activated:
 - 3> trigger the lower layers to initiate the measurement gap activation request using UL MAC CE as specified in TS 38.321 [3];

2> else:

- 3> initiate the procedure to indicate start as specified in clause 5.5.6.3;
- NOTE 1: The UE verifies the measurement gap situation only upon receiving the indication from upper layers. If at this point in time sufficient gaps are available, the UE does not initiate the procedure. Unless it receives a new indication from upper layers, the UE is only allowed to further repeat the procedure in the same PCell once per frequency of the target RAT if the provided measurement gaps are insufficient.
- NOTE 1a: When indication is received from upper layers for performing location measurement and there is preconfigured measurement gap configured (not preconfigured measurement gap for positioning), the UE considers this preconfigured measurement gap to be not sufficient if the measurement gap is not considered to be always activated according to clause 9.1.7.2 of TS 38.133 [14].
- 1> if and only if upper layers indicate to stop performing location measurements towards E-UTRA or NR or stop subframe and slot timing detection towards E-UTRA:
 - 2> if there is no activated preconfigured measurement gap for positioning:
 - 3> if there is previously triggered UL MAC CE transmission for the measurement gap activation for positioning:
 - 4> indicate to the lower layers to cancel the triggered UL MAC CE transmission for the measurement gap activation as specified in TS 38.321 [3];
 - 3> else:
 - 4> initiate the procedure to indicate stop as specified in 5.5.6.3.
 - 2> else if there is activated preconfigured measurement gap for positioning:
 - 3> trigger the lower layers to deactivate all the activated measurement gap(s) for positioning as specified in TS 38.321 [3].
- NOTE 2: The UE may initiate the procedure to indicate stop even if it did not previously initiate the procedure to indicate start.

5.5.6.3 Actions related to transmission of *LocationMeasurementIndication* message

The UE shall set the contents of LocationMeasurementIndication message as follows:

- 1> if the procedure is initiated to indicate start of location related measurements:
 - 2> if the procedure is initiated for RSTD measurements towards E-UTRA:
 - 3> set the *measurementIndication* to the *eutra-RSTD* according to the information received from upper layers;
 - 2> else if the procedure is initiated for positioning measurement towards NR:
 - 3> set the *measurementIndication* to the *nr-PRS-Measurement* according to the information received from upper layers;
- 1> else if the procedure is initiated to indicate stop of location related measurements:

- 2> set the *measurementIndication* to the value *release*;
- 1> if the procedure is initiated to indicate start of subframe and slot timing detection towards E-UTRA:
 - 2> set the *measurementIndication* to the value *eutra-FineTimingDetection*;
- 1> else if the procedure is initiated to indicate stop of subframe and slot timing detection towards E-UTRA:
 - 2> set the *measurementIndication* to the value *release*;
- 1> submit the LocationMeasurementIndication message to lower layers for transmission, upon which the procedure ends.

5.5a Logged Measurements

5.5a.1 Logged Measurement Configuration

5.5a.1.1 General



Figure 5.5a.1.1-1: Logged measurement configuration

The purpose of this procedure is to configure the UE to perform logging of measurement results while in RRC_IDLE and RRC_INACTIVE. The procedure applies to logged measurements capable UEs that are in RRC_CONNECTED.

NOTE: NG-RAN may retrieve stored logged measurement information by means of the UE information procedure.

5.5a.1.2 Initiation

NG-RAN initiates the logged measurement configuration procedure to UE in RRC_CONNECTED by sending the *LoggedMeasurementConfiguration* message.

5.5a.1.3 Reception of the *LoggedMeasurementConfiguration* by the UE

Upon receiving the *LoggedMeasurementConfiguration* message the UE shall:

- 1> discard the logged measurement configuration as well as the logged measurement information as specified in 5.5a.2;
- 1> store the received loggingDuration, reportType and areaConfiguration, if included, in VarLogMeasConfig;
- 1> if the LoggedMeasurementConfiguration message includes plmn-IdentityList:
 - 2> set *plmn-IdentityList* in *VarLogMeasReport* to include the RPLMN as well as the PLMNs included in *plmn-IdentityList*;

1> else:

- 2> set plmn-IdentityList in VarLogMeasReport to include the RPLMN;
- 1> store the received absoluteTimeInfo, traceReference, traceRecordingSessionRef, and tce-Id in VarLogMeasReport;
- 1> store the received bt-NameList, if included, in VarLogMeasConfig;
- 1> store the received wlan-NameList, if included, in VarLogMeasConfig;
- 1> store the received sensor-NameList, if included, in VarLogMeasConfig;
- 1> start timer T330 with the timer value set to the *loggingDuration*;
- 1> store the received *sigLoggedMeasType*, if included, in *VarLogMeasReport*;
- 1> store the received *earlyMeasIndication*, if included, in *VarLogMeasConfig*;

5.5a.1.4 T330 expiry

Upon expiry of T330 the UE shall:

1> release VarLogMeasConfig;

The UE is allowed to discard stored logged measurements, i.e. to release *VarLogMeasReport*, 48 hours after T330 expiry.

5.5a.2 Release of Logged Measurement Configuration

5.5a.2.1 General

The purpose of this procedure is to release the logged measurement configuration as well as the logged measurement information.

5.5a.2.2 Initiation

The UE shall initiate the procedure upon receiving a logged measurement configuration in another RAT. The UE shall also initiate the procedure upon power off or upon deregistration.

The UE shall:

- 1> stop timer T330, if running;
- 1> if stored, discard the logged measurement configuration as well as the logged measurement information, i.e. release the UE variables *VarLogMeasConfig* and *VarLogMeasReport*.

5.5a.3 Measurements logging

5.5a.3.1 General

This procedure specifies the logging of available measurements by a UE in RRC_IDLE and RRC_INACTIVE that has a logged measurement configuration. The actual process of logging within the UE, takes place in RRC IDLE state could continue in RRC INACTIVE state or vice versa.

5.5a.3.2 Initiation

While T330 is running and SDT procedure is not ongoing, the UE shall:

- 1> if measurement logging is suspended:
 - 2> if during the last logging interval the IDC problems detected by the UE is resolved, resume measurement logging;

- 1> if not suspended, perform the logging in accordance with the following:
 - 2> if the *reportType* is set to *periodical* in the *VarLogMeasConfig*:
 - 3> if the UE is in any cell selection state (as specified in TS 38.304 [20]):
 - 4> perform the logging at regular time intervals, as defined by the *loggingInterval* in the *VarLogMeasConfig*;
 - 3> if the UE is in camped normally state on an NR cell and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 4> if areaConfiguration is not included in VarLogMeasConfig; or
 - 4> if the serving cell is part of the area indicated by *areaConfig* in *areaConfiguration* in *VarLogMeasConfig*:
 - 5> perform the logging at regular time intervals, as defined by the *loggingInterval* in the *VarLogMeasConfig*;
 - 2> else if the reportType is set to eventTriggered, and eventType is set to outOfCoverage:
 - 3> perform the logging at regular time intervals as defined by the *loggingInterval* in *VarLogMeasConfig* only when the UE is in any cell selection state;
 - 3> upon transition from any cell selection state to camped normally state in NR:
 - 4> if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport; and
 - 4> if *areaConfiguration* is not included in *VarLogMeasConfig* or if the current camping cell is part of the area indicated by *areaConfig* of *areaConfiguration* in *VarLogMeasConfig*:
 - 5> perform the logging;
 - 2> else if the *reportType* is set to *eventTriggered* and *eventType* is set to *eventL1*:
 - 3> if the UE is in camped normally state on an NR cell and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 4> if areaConfiguration is not included in VarLogMeasConfig; or
 - 4> if the serving cell is part of the area indicated by *areaConfig* in *areaConfiguration* in *VarLogMeasConfig*;
 - 5> perform the logging at regular time intervals as defined by the *loggingInterval* in *VarLogMeasConfig* only when the conditions indicated by the *eventL1* are met;
 - 2> when performing the logging:
 - 3> if InterFreqTargetInfo is configured and if the UE detected IDC problems on at least one of the frequencies included in InterFreqTargetInfo during the last logging interval, or
 - 3> if InterFreqTargetInfo is not configured and if the UE detected IDC problems during the last logging interval:
 - 4> if *measResultServingCell* in the *VarLogMeasReport* is not empty:
 - 5> include inDeviceCoexDetected;
 - 5> suspend measurement logging from the next logging interval;
 - 4> else:
 - 5> suspend measurement logging;
 - 3> set the relativeTimeStamp to indicate the elapsed time since the moment at which the logged measurement configuration was received;

- 3> if location information became available during the last logging interval, set the content of the *locationInfo* as in 5.3.3.7:
- 3> if the UE is in any cell selection state (as specified in TS 38.304 [20]):
 - 4> set any Cell Selection Detected to indicate the detection of no suitable or no acceptable cell found;
 - 4> if the reportType is set to eventTriggered in the VarLogMeasConfig; and
 - 4> if the RPLMN at the time of entering the any cell selection state is included in *plmn-IdentityList* stored in *VarLogMeasReport*; and
 - 4> if *areaConfiguration* is not included in *VarLogMeasConfig* or if the last suitable cell that the UE was camping on is part of the area indicated by *areaConfig* of *areaConfiguration* in *VarLogMeasConfig*:
 - 5> set the *servCellIdentity* to indicate global cell identity of the last suitable cell that the UE was camping on;
 - 5> set the *measResultServingCell* to include the quantities of the last suitable cell the UE was camping on;
 - 4> else if the *reportType* is set to *periodical* in the *VarLogMeasConfig*:
 - 5> set the *servCellIdentity* to indicate global cell identity of the last logged cell that the UE was camping on;
 - 5> set the *measResultServingCell* to include the quantities of the last logged cell the UE was camping on:

3> else:

- 4> set the servCellIdentity to indicate global cell identity of the cell the UE is camping on;
- 4> set the measResultServingCell to include the quantities of the cell the UE is camping on;
- 3> if available, set the *measResultNeighCells*, in order of decreasing ranking-criterion as used for cell reselection, to include measurements of neighbouring cell that became available during the last logging interval and according to the following:
 - 4> include measurement results for at most 6 neighbouring cells on the NR serving frequency and for at most 3 cells per NR neighbouring frequency and for the NR neighbouring frequencies in accordance with the following:
 - 5> if interFreqTargetInfo is included in VarLogMeasConfig:
 - 6> if earlyMeasIndication is included in VarLogMeasConfig;
 - 7> include measurement results for NR neighbouring frequencies that are included in both interFreqTargetInfo and either in measIdleCarrierListNR (within the VarMeasIdleConfig) or SIB4;
 - 6> else:
 - 7> include measurement results for NR neighbouring frequencies that are included in both *interFreqTargetInfo* and *SIB4*;

5> else:

- 6> if earlyMeasIndication is included in VarLogMeasConfig;
 - 7> include measurement results for NR neighbouring frequencies that are included in either *measIdleCarrierListNR* (within the *VarMeasIdleConfig*) or *SIB4*;

6> else:

7> include measurement results for NR neighbouring frequencies that are included in SIB4;

- 4> include measurement results for at most 3 neighbours per inter-RAT frequency in accordance with the following:
 - 5> if earlyMeasIndication is included in VarLogMeasConfig:
 - 6> include measurement results for inter-RAT neighbouring frequencies that are included in either *measIdleCarrierListEUTRA* (within the *VarMeasIdleConfig*) or *SIB5*;
 - 5> else:
 - 6> include measurement results for inter-RAT frequencies that are included in SIB5;
- 4> for each neighbour cell included, include the optional fields that are available;
- NOTE 1: The UE includes the latest results of the available measurements as used for cell reselection evaluation in RRC_IDLE or RRC_INACTIVE, which are performed in accordance with the performance requirements as specified in TS 38.133 [14].
- NOTE 2: For logging the measurements on frequencies (indicated in *measIdleCarrierListNR/ measIdleCarrierListEUTRA*) in the logged measurement, the *qualityThreshold* in *measIdleConfig* should not be applied, and how the UE logs the measurements on the frequencies is left to the UE implementation.
 - 2> when the memory reserved for the logged measurement information becomes full, stop timer T330 and perform the same actions as performed upon expiry of T330, as specified in 5.5a.1.4.

5.6 UE capabilities

5.6.1 UE capability transfer

5.6.1.1 General

This clause describes how the UE compiles and transfers its UE capability information upon receiving a UECapabilityEnquiry from the network.

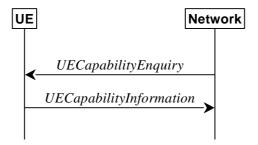


Figure 5.6.1.1-1: UE capability transfer

5.6.1.2 Initiation

The network initiates the procedure to a UE in RRC_CONNECTED when it needs (additional) UE radio access capability information. The network should retrieve UE capabilities only after AS security activation. Network does not forward UE capabilities that were retrieved before AS security activation to the CN.

5.6.1.3 Reception of the *UECapabilityEnguiry* by the UE

The UE shall set the contents of UECapabilityInformation message as follows:

- 1> if the ue-CapabilityRAT-RequestList contains a UE-CapabilityRAT-Request with rat-Type set to nr:
 - 2> include in the *ue-CapabilityRAT-ContainerList* a *UE-CapabilityRAT-Container* of the type *UE-NR-Capability* and with the *rat-Type* set to *nr*;

- 2> include the *supportedBandCombinationList*, *featureSets* and *featureSetCombinations* as specified in clause 5.6.1.4:
- 1> if the ue-CapabilityRAT-RequestList contains a UE-CapabilityRAT-Request with rat-Type set to eutra-nr:
 - 2> if the UE supports (NG)EN-DC or NE-DC:
 - 3> include in the *ue-CapabilityRAT-ContainerList* a *UE-CapabilityRAT-Container* of the type *UE-MRDC-Capability* and with the *rat-Type* set to *eutra-nr*;
 - 3> include the supportedBandCombinationList and featureSetCombinations as specified in clause 5.6.1.4;
- 1> if the ue-CapabilityRAT-RequestList contains a UE-CapabilityRAT-Request with rat-Type set to eutra:
 - 2> if the UE supports E-UTRA:
 - 3> include in the *ue-CapabilityRAT-ContainerList* a *ue-CapabilityRAT-Container* of the type *UE-EUTRA-Capability* and with the *rat-Type* set to *eutra* as specified in TS 36.331 [10], clause 5.6.3.3, according to the *capabilityRequestFilter*, if received;
- 1> if the ue-CapabilityRAT-RequestList contains a UE-CapabilityRAT-Request with rat-Type set to utra-fdd:
 - 2> if the UE supports UTRA-FDD:
 - 3> include the UE radio access capabilities for UTRA-FDD within a *ue-CapabilityRAT-Container* and with the *rat-Type* set to *utra-fdd*;
- 1> if the RRC message segmentation is enabled based on the field *rrc-SegAllowed* received, and the encoded RRC message is larger than the maximum supported size of a PDCP SDU specified in TS 38.323 [5]:
 - 2> initiate the UL message segment transfer procedure as specified in clause 5.7.7;
- 1> else:
 - 2> submit the UECapabilityInformation message to lower layers for transmission, upon which the procedure ends.

5.6.1.4 Setting band combinations, feature set combinations and feature sets supported by the UE

The UE invokes the procedures in this clause if the NR or E-UTRA network requests UE capabilities for *nr*, *eutra-nr* or *eutra*. This procedure is invoked once per requested *rat-Type* (see clause 5.6.1.3 for capability enquiry by the NR network; see TS 36.331 [10], clause 5.6.3.3 for capability enquiry by the E-UTRA network). The UE shall ensure that the feature set IDs are consistent across feature sets, feature set combinations and band combinations in all three UE capability containers that the network queries with the same fields with the same values, i.e. *UE-CapabilityRequestFilterNR*, *UE-CapabilityRequestFilterCommon* and fields in *UECapabilityEnquiry* message (i.e. *requestedFreqBandsNR-MRDC*, *requestedCapabilityNR*, *eutra-nr-only* flag, and *requestedCapabilityCommon*) as defined in TS 36.331, where applicable.

- NOTE 1: Capability enquiry without frequencyBandListFilter is not supported.
- NOTE 2: In (NG)EN-DC, the gNB needs the capabilities for RAT types nr and eutra-nr and it uses the featureSets in the UE-NR-Capability together with the featureSetCombinations in the UE-MRDC-Capability to determine the NR UE capabilities for the supported MRDC band combinations. Similarly, the eNB needs the capabilities for RAT types eutra and eutra-nr and it uses the featureSetsEUTRA in the UE-EUTRA-Capability together with the featureSetCombinations in the UE-MRDC-Capability to determine the E-UTRA UE capabilities for the supported MRDC band combinations. Hence, the IDs used in the featureSets must match the IDs referred to in featureSetCombinations across all three containers. The requirement on consistency implies that there are no undefined feature sets and feature set combinations.
- NOTE 3: If the UE cannot include all feature sets and feature set combinations due to message size or list size constraints, it is up to UE implementation which feature sets and feature set combinations it prioritizes.

The UE shall:

- 1> compile a list of "candidate band combinations" according to the filter criteria in capabilityRequestFilterCommon (if included), only consisting of bands included in frequencyBandListFilter, and prioritized in the order of frequencyBandListFilter (i.e. first include band combinations containing the first-listed band, then include remaining band combinations containing the second-listed band, and so on), where for each band in the band combination, the parameters of the band do not exceed maxBandwidthRequestedDL, maxBandwidthRequestedUL, maxCarriersRequestedDL, maxCarriersRequestedUL, ca-BandwidthClassDL-EUTRA or ca-BandwidthClassUL-EUTRA, whichever are received;
- 1> for each band combination included in the list of "candidate band combinations":
 - 2> if the network (E-UTRA) included the eutra-nr-only field, or
 - 2> if the requested *rat-Type* is *eutra*:
 - 3> remove the NR-only band combination from the list of "candidate band combinations";
- NOTE 4: The (E-UTRA) network may request capabilities for *nr* but indicate with the *eutra-nr-only* flag that the UE shall not include any NR band combinations in the *UE-NR-Capability*. In this case the procedural text above removes all NR-only band combinations from the candidate list and thereby also avoids inclusion of corresponding feature set combinations and feature sets below.
 - 2> if it is regarded as a fallback band combination with the same capabilities of another band combination included in the list of "candidate band combinations", and
 - 2> if this fallback band combination is generated by releasing at least one SCell or uplink configuration of SCell or SUL according to TS 38.306 [26]:
 - 3> remove the band combination from the list of "candidate band combinations";
- NOTE 5: Even if the network requests (only) capabilities for *nr*, it may include E-UTRA band numbers in the *frequencyBandListFilter* to ensure that the UE includes all necessary feature sets needed for subsequently requested *eutra-nr* capabilities. At this point of the procedure the list of "candidate band combinations" contains all NR- and/or E-UTRA-NR band combinations that match the filter (*frequencyBandListFilter*) provided by the NW and that match the *eutra-nr-only* flag (if RAT-Type *nr* is requested by E-UTRA). In the following, this candidate list is used to derive the band combinations, feature set combinations and feature sets to be reported in the requested capability container.
- 1> if the requested *rat-Type* is *nr*:
 - 2> include into *supportedBandCombinationList* as many NR-only band combinations as possible from the list of "candidate band combinations", starting from the first entry;
 - 3> if *srs-SwitchingTimeRequest* is received:
 - 4> if SRS carrier switching is supported;
 - 5> include srs-SwitchingTimesListNR for each band combination;
 - 4> set srs-SwitchingTimeRequested to true;
 - 2> include, into *featureSetCombinations*, the feature set combinations referenced from the supported band combinations as included in *supportedBandCombinationList* according to the previous;
 - 2> compile a list of "candidate feature set combinations" referenced from the list of "candidate band combinations" excluding entries (rows in feature set combinations) with same or lower capabilities;
 - 2> if *uplinkTxSwitchRequest* is received:
 - 3> include into *supportedBandCombinationList-UplinkTxSwitch* as many NR-only band combinations that supported UL TX switching as possible from the list of "candidate band combinations", starting from the first entry;
 - 4> if *srs-SwitchingTimeRequest* is received:
 - 5> if SRS carrier switching is supported;

- 6> include *srs-SwitchingTimesListNR* for each band combination;
- 5> set *srs-SwitchingTimeRequested* to true;
- 3> include, into *featureSetCombinations*, the feature set combinations referenced from the supported band combinations as included in *supportedBandCombinationList-UplinkTxSwitch* according to the previous;
- NOTE 6: This list of "candidate feature set combinations" contains the feature set combinations used for NR-only as well as E-UTRA-NR band combinations. It is used to derive a list of NR feature sets referred to from the feature set combinations in the *UE-NR-Capability* and from the feature set combinations in a *UE-MRDC-Capability* container.
 - 2> if *sidelinkRequest* is received:
 - 3> for a sidelink band combination the UE included in supportedBandCombinationListSidelinkEUTRA-NR, supportedBandCombinationListSL-RelayDiscovery or supportedBandCombinationListSL-NonRelayDiscovery:
 - 4> if the UE supports partial sensing for a band of the sidelink band combination, include the partial sensing capabilities for the band using the *sl-TransmissionMode2-PartialSensing-r17*;
 - 3> set sidelinkRequested to true;
 - 2> include into featureSets the feature sets referenced from the "candidate feature set combinations" and may exclude the feature sets with the parameters that exceed any of maxBandwidthRequestedDL, maxBandwidthRequestedUL, maxCarriersRequestedDL or maxCarriersRequestedUL, whichever are received;
- 1> else, if the requested *rat-Type* is *eutra-nr*:
 - 2> include into supportedBandCombinationList and/or supportedBandCombinationListNEDC-Only as many E-UTRA-NR band combinations as possible from the list of "candidate band combinations", starting from the first entry;
 - 3> if *srs-SwitchingTimeRequest* is received:
 - 4> if SRS carrier switching is supported;
 - 5> include srs-SwitchingTimesListNR and srs-SwitchingTimesListEUTRA for each band combination;
 - 4> set srs-SwitchingTimeRequested to true;
 - 2> include, into *featureSetCombinations*, the feature set combinations referenced from the supported band combinations as included in *supportedBandCombinationList* according to the previous;
 - 2> if *uplinkTxSwitchRequest* is received:
 - 3> include into *supportedBandCombinationList-UplinkTxSwitch* as many E-UTRA-NR band combinations that supported UL TX switching as possible from the list of "candidate band combinations", starting from the first entry;
 - 4> if srs-SwitchingTimeRequest is received:
 - 5> if SRS carrier switching is supported;
 - 6> include *srs-SwitchingTimesListNR* and *srs-SwitchingTimesListEUTRA* for each band combination;
 - 5> set *srs-SwitchingTimeRequested* to true;
 - 3> include, into *featureSetCombinations*, the feature set combinations referenced from the supported band combinations as included in *supportedBandCombinationList-UplinkTxSwitch* according to the previous;
- 1> else (if the requested *rat-Type* is *eutra*):
 - 2> compile a list of "candidate feature set combinations" referenced from the list of "candidate band combinations" excluding entries (rows in feature set combinations) with same or lower capabilities;

- NOTE 7: This list of "candidate feature set combinations" contains the feature set combinations used for E-UTRA-NR band combinations. It is used to derive a list of E-UTRA feature sets referred to from the feature set combinations in a *UE-MRDC-Capability* container.
 - 2> include into *featureSetsEUTRA* (in the *UE-EUTRA-Capability*) the feature sets referenced from the "candidate feature set combinations" and may exclude the feature sets with the parameters that exceed *ca-BandwidthClassDL-EUTRA* or *ca-BandwidthClassUL-EUTRA*, whichever are received;
- 1> include the received *frequencyBandListFilter* in the field *appliedFreqBandListFilter* of the requested UE capability, except if the requested *rat-Type* is *nr* and the network included the *eutra-nr-only* field;
- 1> if the network included *ue-CapabilityEnquiryExt*:
 - 2> include the received *ue-CapabilityEnguiryExt* in the field *receivedFilters*;

5.6.1.5 Void

5.7 Other

5.7.1 DL information transfer

5.7.1.1 General

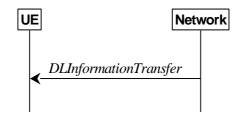


Figure 5.7.1.1-1: DL information transfer

The purpose of this procedure is to transfer NAS dedicated information from NG-RAN to a UE in RRC_CONNECTED or to a UE in RRC_INACTIVE during SDT, or to transfer F1-C related information from IAB Donor-CU to IAB-DU via the collocated IAB-MT in RRC_CONNECTED.

5.7.1.2 Initiation

The network initiates the DL information transfer procedure whenever there is a need to transfer NAS dedicated information, or F1-C related information to an IAB-node. The network initiates the DL information transfer procedure by sending the *DLInformationTransfer* message.

5.7.1.3 Reception of the *DLInformationTransfer* by the UE

Upon receiving *DLInformationTransfer* message, the UE shall:

- 1> if *dedicatedNAS-Message* is included:
 - 2> forward dedicatedNAS-Message to upper layers.
- 1> if referenceTimeInfo is included:
 - 2> calculate the reference time based on the time, referenceSFN and timeInfoType if it is included;
 - 2> calculate the uncertainty of the reference time based on the *uncertainty*, if *uncertainty* is included;
 - 2> inform upper layers of the reference time and, if *uncertainty* is included, of the uncertainty;
 - 2> ignore all further referenceTimeInfo received in SIB9, if any.

- 1> if sib9Fallback is included:
 - 2> apply referenceTimeInfo in SIB9.
- 1> if *rxTxTimeDiff-gNB* is included:
 - 2> calculate the propagation delay based on the UE Rx-Tx time difference measurement and the received Rx-Tx time difference measurement at the gNB;
 - 2> inform upper layers of the propagation delay.
- 1> if ta-PDC is set to activate:
 - 2> inform upper layers of the propagation delay determined by the accumulated Timing Advance commands.

Upon receiving *DLInformationTransfer* message, the IAB-MT shall:

- 1> if *dedicatedInfoF1c* is included:
 - 2> forward dedicatedInfoF1c to the collocated IAB-DU.

5.7.1a DL information transfer for MR-DC

5.7.1a.1 General



Figure 5.7.1a.1-1: DL information transfer MR-DC

The purpose of this procedure is to transfer RRC messages from the network to the UE over SRB3 (e.g. an NR RRC reconfiguration message including *reconfigurationWithSync*, an E-UTRA RRC connection reconfiguration message including *mobilityControlInfo*, an RRC connection release message, a *MobilityFromNRCommand* message, or a *MobilityFromEUTRACommand* message) during fast MCG link recovery.

5.7.1a.2 Initiation

The network initiates this procedure whenever there is a need to transfer an RRC message during fast MCG link recovery.

5.7.1a.3 Actions related to reception of *DLInformationTransferMRDC* message

Upon receiving the *DLInformationTransferMRDC*, the UE shall:

- 1> if the RRCReconfiguration message is included in dl-DCCH-MessageNR:
 - 2> perform the RRC reconfiguration procedure according to 5.3.5.3;
- 1> else if the RRCRelease message is included in dl-DCCH-MessageNR:
 - 2> perform the RRC release procedure according to 5.3.8;
- 1> else if the *MobilityFromNRCommand* message is included in the *dl-DCCH-MessageNR*:
 - 2> perform the mobility from NR procedure according to 5.4.3.3;
- 1> else if the E-UTRA RRCConnectionReconfiguration message is included in dl-DCCH-MessageEUTRA:
 - 2> perform the RRC connection reconfiguration procedure as specified in TS 36.331 [10], clause 5.3.5.4;

- 1> else if the E-UTRA RRCConnectionRelease message is included in dl-DCCH-MessageEUTRA:
 - 2> perform the RRC connection release as specified in TS 36.331 [10], clause 5.3.8;
- 1> else if the MobilityFromEUTRACommand message is included in the dl-DCCH-MessageEUTRA:
 - 2> perform the mobility from E-UTRA procedure as specified in TS 36.331 [10], clause 5.4.3.3;

5.7.2 UL information transfer

5.7.2.1 General

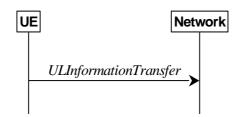


Figure 5.7.2.1-1: UL information transfer

The purpose of this procedure is to transfer NAS dedicated information from the UE to the network, or to transfer F1-C related information from IAB-DU to IAB Donor-CU via the collocated IAB-MT in RRC CONNECTED.

5.7.2.2 Initiation

A UE in RRC_CONNECTED or a UE in RRC_INACTIVE during SDT initiates the UL information transfer procedure whenever there is a need to transfer NAS dedicated information. The UE initiates the UL information transfer procedure by sending the ULInformationTransfer message. In addition, an IAB-MT in RRC CONNECTED initiates the UL information transfer procedure whenever there is a need to transfer F1-C related information. When F1-C related information has to be transferred, the IAB-MT shall initiate the procedure only if SRB2 or split SRB2 is established.

5.7.2.3 Actions related to transmission of *ULInformationTransfer* message

The UE shall set the contents of the *ULInformationTransfer* message as follows:

- 1> if the upper layer provides NAS PDU:
 - 2> set the *dedicatedNAS-Message* to include the information received from upper layers;
- 1> for the IAB-MT, if there is a need to transfer F1-C related information:
 - 2> include the *dedicatedInfoF1c*;
- 1> submit the *ULInformationTransfer* message to lower layers for transmission, upon which the procedure ends.

5.7.2.4 Failure to deliver *ULInformationTransfer* message

The UE shall:

- 1> if AS security is not started and radio link failure occurs before the successful delivery of *ULInformationTransfer* messages has been confirmed by lower layers; or
- 1> if PDCP re-establishment or release/addition (e.g due to key refresh upon PCell or PSCell change, or RRC connection re-establishment, or failure of resume procedure initiated for SDT) occurs on an SRB on which ULInformationTransfer messages were submitted for transmission but successful delivery of these messages was not confirmed by lower layers:

2> inform upper layers about the possible failure to deliver the information contained in the concerned *ULInformationTransfer* messages, unless the messages only include *dedicatedInfoF1c*.

5.7.2a UL information transfer for MR-DC

5.7.2a.1 General



Figure 5.7.2a.1-1: UL information transfer MR-DC

The purpose of this procedure is to transfer MR-DC dedicated information from the UE to the network e.g. the NR or E-UTRA RRC MeasurementReport, FailureInformation, UEAssistanceInformation, RRCReconfigurationComplete, MCGFailureInformation, or IABOtherInformation message.

5.7.2a.2 Initiation

A UE in RRC_CONNECTED initiates the UL information transfer for MR-DC procedure whenever there is a need to transfer MR-DC dedicated information. I.e. the procedure is not used during an RRC connection reconfiguration involving NR or E-UTRA connection reconfiguration, in which case the MR DC information is piggybacked to the *RRCReconfigurationComplete* message, except in the case the UE executes an intra-SN CPC.

5.7.2a.3 Actions related to transmission of *ULInformationTransferMRDC* message

The UE shall set the contents of the *ULInformationTransferMRDC* message as follows:

- 1> if there is a need to transfer MR-DC dedicated information related to NR:
 - 2> set the *ul-DCCH-MessageNR* to include the NR MR-DC dedicated information to be transferred (e.g., NR RRC *MeasurementReport, UEAssistanceInformation, FailureInformation, RRCReconfigurationComplete, MCGFailureInformation*, or *IABOtherInformation* message);
- 1> else if there is a need to transfer MR-DC dedicated information related to E-UTRA:
 - 2> set the *ul-DCCH-MessageEUTRA* to include the E-UTRA MR-DC dedicated information to be transferred (e.g., E-UTRA RRC *MeasurementReport*, or *MCGFailureInformation* message);
- 1> submit the *ULInformationTransferMRDC* message to lower layers for transmission, upon which the procedure ends.

5.7.2b UL transfer of IRAT information

5.7.2b.1 General

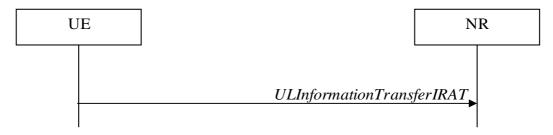


Figure 5.7.2b.1-1: UL transfer of IRAT information

The purpose of this procedure is to transfer from the UE to NR MCG dedicated information terminated at the NR MCG but specified by another RAT e.g. the E-UTRA *MeasurementReport* message, the E-UTRA *SidelinkUEInformation* message or the E-UTRA *UEAssistanceInformation* message. The specific information transferred in this message is set in accordance with:

- the procedure specified in 5.6.10 of TS 36.331 [10] for E-UTRA UEAssistanceInformation message;
- the procedure specified in 5.10.2 of TS 36.331 [10] for E-UTRA SidelinkUEInformation message;
- the procedure specified in 5.5.5 of TS 36.331 [10] for E-UTRA *MeasurementReport* Message.

5.7.2b.2 Initiation

A UE in RRC_CONNECTED initiates the UL information transfer procedure whenever there is a need to transfer dedicated inter-RAT information as specified in TS 36.331 [10].

5.7.2b.3 Actions related to transmission of *ULInformationTransferIRAT* message

The UE shall set the contents of the *ULInformationTransferIRAT* message as follows:

- 1> if there is a need to transfer dedicated LTE information related to V2X sidelink communications:
 - 2> set the *ul-DCCH-MessageEUTRA* to include the V2X sidelink communication information to be transferred (e.g. the E-UTRA RRC *MeasurementReport* message, the E-UTRA RRC *SidelinkUEInformation* message, or the E-UTRA RRC *UEAssistanceInformation* message);
- 1> submit the *ULInformationTransferIRAT* message to lower layers for transmission, upon which the procedure ends:

5.7.3 SCG failure information

5.7.3.1 General

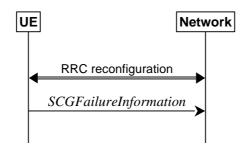


Figure 5.7.3.1-1: SCG failure information

The purpose of this procedure is to inform E-UTRAN or NR MN about an SCG failure the UE has experienced i.e. SCG radio link failure, beam failure of the PSCell while the SCG is deactivated, failure of SCG reconfiguration with sync, SCG configuration failure for RRC message on SRB3, SCG integrity check failure, and consistent uplink LBT failures on PSCell for operation with shared spectrum channel access.

5.7.3.2 Initiation

A UE initiates the procedure to report SCG failures when neither MCG nor SCG transmission is suspended and when one of the following conditions is met:

- 1> upon detecting radio link failure for the SCG, in accordance with clause 5.3.10.3;
- 1> upon detecting beam failure of the PSCell while the SCG is deactivated, in accordance with TS 38.321[3];
- 1> upon reconfiguration with sync failure of the SCG, in accordance with clause 5.3.5.8.3;
- 1> upon SCG configuration failure, in accordance with clause 5.3.5.8.2;

1> upon integrity check failure indication from SCG lower layers concerning SRB3.

Upon initiating the procedure, the UE shall:

- 1> if the procedure was not initiated due to beam failure of the PSCell while the SCG is deactivated:
 - 2> suspend SCG transmission for all SRBs, DRBs and, if any, BH RLC channels;
 - 2> reset SCG MAC;
- 1> stop T304 for the SCG, if running;
- 1> stop conditional reconfiguration evaluation for CPC or CPA, if configured;
- 1> if the UE is in (NG)EN-DC:
 - 2> initiate transmission of the SCGFailureInformationNR message as specified in TS 36.331 [10], clause 5.6.13a.
- 1> else:
 - 2> initiate transmission of the SCGFailureInformation message in accordance with 5.7.3.5.

5.7.3.3 Failure type determination for (NG)EN-DC

The UE shall set the SCG failure type as follows:

- 1> if the UE initiates transmission of the SCGFailureInformationNR message due to T310 expiry:
 - 2> set the *failureType* as t310-Expiry;
- 1> else if the UE initiates transmission of the SCGFailureInformationNR message due to T312 expiry:
 - 2> set the failureType as any value and set the failureType-v1610 as t312-Expiry;
- 1> else if the UE initiates transmission of the *SCGFailureInformationNR* message to provide reconfiguration with sync failure information for an SCG:
 - 2> set the failureType as synchReconfigFailureSCG;
- 1> else if the UE initiates transmission of the *SCGFailureInformationNR* message to provide random access problem indication from SCG MAC:
 - 2> if the random access procedure was initiated for beam failure recovery:
 - 3> set the *failureType* as *randomAccessProblem* and set the *failureType-v1610* as *beamFailureRecoveryFailure*;
 - 2> else:
 - 3> set the *failureType* as *randomAccessProblem*;
- 1> else if the UE initiates transmission of the *SCGFailureInformationNR* message to provide indication from SCG RLC that the maximum number of retransmissions has been reached:
 - 2> set the *failureType* as *rlc-MaxNumRetx*;
- 1> else if the UE initiates transmission of the SCGFailureInformationNR message due to SRB3 integrity check failure:
 - 2> set the *failureType* as *srb3-IntegrityFailure*;
- 1> else if the UE initiates transmission of the *SCGFailureInformationNR* message due to Reconfiguration failure of NR RRC reconfiguration message:
 - 2> set the *failureType* as *scg-reconfigFailure*;

- 1> else if the UE initiates transmission of the SCGFailureInformationNR message due to consistent uplink LBT failures:
 - 2> set the *failureType* as any value and set the *failureType-v1610* as *scg-lbtFailure*;
- 1> else if connected as an IAB-node and the *SCGFailureInformationNR* is initiated due to the reception of a BH RLF indication on BAP entity from the SCG:
 - 2> set the failureType as any value and set failureType-v1610 as bh-RLF.
- 1> else if the UE initiates transmission of the *SCGFailureInformationNR* message due to beam failure of the PSCell while the SCG is deactivated:
 - 2> set the failureType as any value and set failureType-v1610 as beamFailure.

5.7.3.4 Setting the contents of *MeasResultSCG-Failure*

The UE shall set the contents of the MeasResultSCG-Failure as follows:

- 1> for each MeasObjectNR configured on NR SCG for which a measId is configured and measurement results are available:
 - 2> include an entry in *measResultPerMOList*;
 - 2> if there is a measId configured with the MeasObjectNR and a reportConfig which has rsType set to ssb:
 - 3> set ssbFrequency to the value indicated by ssbFrequency as included in the MeasObjectNR;
 - 2> if there is a measId configured with the MeasObjectNR and a reportConfig which has rsType set to csi-rs:
 - 3> set *refFreqCSI-RS* to the value indicated by *refFreqCSI-RS* as included in the associated measurement object;
 - 2> if a serving cell is associated with the MeasObjectNR:
 - 3> set *measResultServingCell* to include the available quantities of the concerned cell and in accordance with the performance requirements in TS 38.133 [14];
 - 2> set the measResultNeighCellList to include the best measured cells, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected the failure, and set its fields as follows:
 - 3> ordering the cells with sorting as follows:
 - 4> based on SS/PBCH block if SS/PBCH block measurement results are available and otherwise based on CSI-RS;
 - 4> using RSRP if RSRP measurement results are available, otherwise using RSRQ if RSRQ measurement results are available, otherwise using SINR;
 - 3> for each neighbour cell included:
 - 4> include the optional fields that are available.
- NOTE: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Exclude-listed cells are not required to be reported.
 - 2> if available, set the *locationInfo* as in 5.3.3.7.:

5.7.3.5 Actions related to transmission of SCGFailureInformation message

The UE shall set the contents of the SCGFailureInformation message as follows:

1> if the UE initiates transmission of the SCGFailureInformation message due to T310 expiry:

- 2> set the *failureType* as *t310-Expiry*;
- 1> else if the UE initiates transmission of the SCGFailureInformation message due to T312 expiry:
 - 2> set the failureType as other and set the failureType-v1610 as t312-Expiry;
- 1> else if the UE initiates transmission of the *SCGFailureInformation* message to provide reconfiguration with sync failure information for an SCG:
 - 2> set the *failureType* as *synchReconfigFailureSCG*;
- 1> else if the UE initiates transmission of the *SCGFailureInformation* message to provide random access problem indication from SCG MAC:
 - 2> if the random access procedure was initiated for beam failure recovery:
 - 3> set the failureType as other and set the failureType-v1610 as beamFailureRecoveryFailure;
 - 2> else:
 - 3> set the *failureType* as *randomAccessProblem*;
- 1> else if the UE initiates transmission of the *SCGFailureInformation* message to provide indication from SCG RLC that the maximum number of retransmissions has been reached:
 - 2> set the *failureType* as *rlc-MaxNumRetx*;
- 1> else if the UE initiates transmission of the SCGFailureInformation message due to SRB3 IP check failure:
 - 2> set the failureType as srb3-IntegrityFailure;
- 1> else if the UE initiates transmission of the *SCGFailureInformation* message due to Reconfiguration failure of NR RRC reconfiguration message:
 - 2> set the failureType as scg-reconfigFailure;
- 1> else if the UE initiates transmission of the *SCGFailureInformation* message due to consistent uplink LBT failures:
 - 2> set the *failureType* as *other* and set the *failureType-v1610* as *scg-lbtFailure*;
- 1> else if connected as an IAB-node and the *SCGFailureInformation* is initiated due to the reception of a BH RLF indication on BAP entity from the SCG:
 - 2> set the *failureType* as *other* and set *failureType-v1610* as *bh-RLF*;
- 1> else if the UE initiates transmission of the *SCGFailureInformation* message due to beam failure of the PSCell while the SCG is deactivated:
 - 2> set the failureType as other and set failureType-v1610 as beamFailure;
- 1> include and set *MeasResultSCG*-Failure in accordance with 5.7.3.4;
- 1> for each MeasObjectNR configured by a MeasConfig associated with the MCG, and for which measurement results are available:
 - 2> include an entry in measResultFreqList;
 - 2> if there is a measId configured with the MeasObjectNR and a reportConfig which has rsType set to ssb:
 - 3> set *ssbFrequency* in *measResultFreqList* to the value indicated by *ssbFrequency* as included in the *MeasObjectNR*;
 - 2> if there is a measId configured with the MeasObjectNR and a reportConfig which has rsType set to csi-rs:
 - 3> set refFreqCSI-RS in measResultFreqList to the value indicated by refFreqCSI-RS as included in the associated measurement object;

- 2> if a serving cell is associated with the *MeasObjectNR*:
 - 3> set *measResultServingCell* in *measResultFreqList* to include the available quantities of the concerned cell and in accordance with the performance requirements in TS 38.133 [14];
- 2> set the *measResultNeighCellList* in *measResultFreqList* to include the best measured cells, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected the failure, and set its fields as follows;
 - 3> ordering the cells with sorting as follows:
 - 4> based on SS/PBCH block if SS/PBCH block measurement results are available and otherwise based on CSI-RS:
 - 4> using RSRP if RSRP measurement results are available, otherwise using RSRQ if RSRQ measurement results are available, otherwise using SINR;
 - 3> for each neighbour cell included:
 - 4> include the optional fields that are available.
- NOTE 1: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Exclude-listed cells are not required to be reported.
- NOTE 2: Field *measResultSCG-Failure* is used to report available results for NR frequencies the UE is configured to measure by SCG RRC signalling.
- 1> if available, set the *locationInfo* as in 5.3.3.7.
- 1> if the UE supports SCG failure for mobility robustness optimization:
 - 2> if the failureType is set to synchReconfigFailureSCG; or
 - 2> if the failure Type is set to randomAccessProblem and the SCG failure was declared while T304 was running:
 - 3> set *perRAInfoList* to indicate the performed random access procedure related information as specified in 5.7.10.5.
 - 3> set the *failedPSCellId* to the physical cell identity and carrier frequency of the target PSCell of the failed PSCell change;
 - 3> set the *previousPSCellId* to the physical cell identity and carrier frequency of the source PSCell associated to the last received *RRCReconfiguration* message including *reconfigurationWithSync* for the SCG;
 - 3> set the *timeSCGFailure* to the elapsed time since reception of the last *RRCReconfiguration* message including the *reconfigurationWithSync* for the SCG until declaring the SCG failure;

2> else:

- 3> set the failedPSCellId to the physical cell identity and carrier frequency of the PSCell in which the SCG failure was declared;
- 3> if the last *RRCReconfiguration* message including the *reconfigurationWithSync* for the SCG was received to enter the PSCell in which the SCG failure was declared:
 - 4> set the *timeSCGFailure* to the elapsed time since reception of the last *RRCReconfiguration* message including the *reconfigurationWithSync* for the SCG until declaring the SCG failure;
 - 4> set the *previousPSCellId* to the physical cell identity and carrier frequency of the source PSCell associated to the last received *RRCReconfiguration* message including *reconfigurationWithSync* for the SCG;

The UE shall submit the SCGFailureInformation message to lower layers for transmission.

5.7.3a EUTRA SCG failure information

5.7.3a.1 General

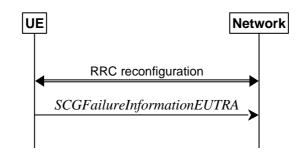


Figure 5.7.3a.1-1: EUTRA SCG failure information

The purpose of this procedure is to inform NR MN about an SCG failure on E-UTRA SN the UE has experienced (e.g. SCG radio link failure, SCG change failure), as specified in TS 36.331 [10] clause 5.6.13.2.

5.7.3a.2 Initiation

A UE initiates the procedure to report EUTRA SCG failures when neither NR MCG nor EUTRA SCG transmission is suspended and in accordance with TS 36.331 [10] clause 5.6.13.2. Actions the UE shall perform upon initiating the procedure, other than related to the transmission of the *SCGFailureInformationEUTRA* message are specified in TS 36.331 [10] clause 5.6.13.2.

5.7.3a.3 Actions related to transmission of SCGFailureInformationEUTRA message

The UE shall set the contents of the SCGFailureInformationEUTRA message as follows:

- 1> include *failureType* within *failureReportSCG-EUTRA* and set it to indicate the SCG failure in accordance with TS 36.331 [10] clause 5.6.13.4;
- 1> include and set measResultSCG-FailureMRDC in accordance with TS 36.331 [10] clause 5.6.13.5;
- 1> for each EUTRA frequency the UE is configured to measure by *measConfig* for which measurement results are available:
 - 2> set the measResultFreqListMRDC to include the best measured cells, ordered such that the best cell is listed first using RSRP to order if RSRP measurement results are available for cells on this frequency, otherwise using RSRQ to order if RSRQ measurement results are available for cells on this frequency, otherwise using SINR to order, and based on measurements collected up to the moment the UE detected the failure, and for each cell that is included, include the optional fields that are available;

NOTE: Field *measResultSCG-FailureMRDC* is used to report available results for E-UTRAN frequencies the UE is configured to measure by E-UTRA RRC signalling.

1> if available, set the *locationInfo* as in 5.3.3.7.:

The UE shall submit the SCGFailureInformationEUTRA message to lower layers for transmission.

5.7.3b MCG failure information

5.7.3b.1 General

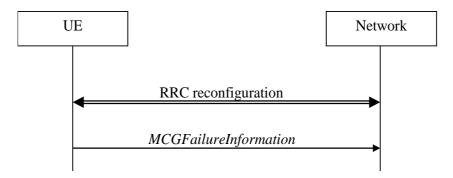


Figure 5.7.3b.1-1: MCG failure information

The purpose of this procedure is to inform the network about an MCG failure the UE has experienced i.e. MCG radio link failure. A UE in RRC_CONNECTED, for which AS security has been activated with SRB2 and at least one DRB or multicast MRB setup or, for IAB, SRB2, may initiate the fast MCG link recovery procedure in order to continue the RRC connection without re-establishment.

5.7.3b.2 Initiation

A UE configured with split SRB1 or SRB3 initiates the procedure to report MCG failures when neither MCG nor SCG transmission is suspended, the SCG is not deactivated, *t316* is configured, and when the following condition is met:

1> upon detecting radio link failure of the MCG, in accordance with 5.3.10.3, while T316 is not running.

Upon initiating the procedure, the UE shall:

- 1> stop timer T310 for the PCell, if running;
- 1> stop timer T312 for the PCell, if running;
- 1> suspend MCG transmission for all SRBs, DRBs, multicast MRBs, except SRB0, and, if any, BH RLC channels;
- 1> reset MCG MAC;
- 1> stop conditional reconfiguration evaluation for CHO, if configured;
- 1> stop conditional reconfiguration evaluation for CPC, if configured;
- 1> initiate transmission of the MCGFailureInformation message in accordance with 5.7.3b.4.

NOTE: The handling of any outstanding UL RRC messages during the initiation of the fast MCG link recovery is left to UE implementation.

5.7.3b.3 Failure type determination

The UE shall set the MCG failure type as follows:

- 1> if the UE initiates transmission of the MCGFailureInformation message due to T310 expiry:
 - 2> set the *failureType* as *t310-Expiry*;
- 1> else if the UE initiates transmission of the MCGFailureInformation message due to T312 expiry:
 - 2> set the *failureType* as *t312-Expiry*;
- 1> else if the UE initiates transmission of the *MCGFailureInformation* message to provide random access problem indication from MCG MAC:
 - 2> if the random access procedure was initiated for beam failure recovery:

- 3> set the failureType as beamFailureRecoveryFailure;
- 2> else:
 - 3> set the failureType as randomAccessProblem;
- 1> else if the UE initiates transmission of the *MCGFailureInformation* message to provide indication from MCG RLC that the maximum number of retransmissions has been reached:
 - 2> set the *failureType* as *rlc-MaxNumRetx*:
- 1> else if the UE initiates transmission of the *MCGFailureInformation* message due to consistent uplink LBT failures on the MCG:
 - 2> set the failureType as lbt-Failure;
- 1> else if connected as an IAB-node and the *MCGFailureInformation* message is initiated due to the reception of a BH RLF indication on BAP entity from the MCG:
 - 2> set the *failureType* as *bh-RLF*.

5.7.3b.4 Actions related to transmission of MCGFailureInformation message

The UE shall set the contents of the MCGFailureInformation message as follows:

- 1> include and set *failureType* in accordance with 5.7.3b.3;
- 1> for each *MeasObjectNR* configured by a *measConfig* associated with the MCG, and for which measurement results are available:
 - 2> include an entry in *measResultFreqList*;
 - 2> if there is a measId configured with the MeasObjectNR and a reportConfig which has rsType set to ssb:
 - 3> set ssbFrequency in measResultFreqList to the value indicated by ssbFrequency as included in the MeasObjectNR;
 - 2> if there is a measId configured with the MeasObjectNR and a reportConfig which has rsType set to csi-rs:
 - 3> set refFreqCSI-RS in measResultFreqList to the value indicated by refFreqCSI-RS as included in the associated measurement object;
 - 2> if a serving cell is associated with the MeasObjectNR:
 - 3> set *measResultServingCell* in *measResultFreqList* to include the available quantities of the concerned cell and in accordance with the performance requirements in TS 38.133 [14];
 - 2> set the *measResultNeighCellList* in *measResultFreqList* to include the best measured cells, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected the failure, and set its fields as follows;
 - 3> ordering the cells with sorting as follows:
 - 4> based on SS/PBCH block if SS/PBCH block measurement results are available and otherwise based on CSI-RS;
 - 4> using RSRP if RSRP measurement results are available, otherwise using RSRQ if RSRQ measurement results are available, otherwise using SINR;
 - 3> for each neighbour cell included:
 - 4> include the optional fields that are available.
- 1> for each EUTRA frequency the UE is configured to measure by *measConfig* for which measurement results are available:

- 2> set the measResultFreqListEUTRA to include the best measured cells, ordered such that the best cell is listed first using RSRP to order the cells if RSRP measurement results are available for cells on this frequency, otherwise using RSRQ to order the cells if RSRQ measurement results are available for cells on this frequency, otherwise using SINR to order the cells, based on measurements collected up to the moment the UE detected the failure, and for each cell that is included, include the optional fields that are available;
- 1> for each UTRA-FDD frequency the UE is configured to measure by *measConfig* for which measurement results are available:
 - 2> set the *measResultFreqListUTRA-FDD* to include the best measured cells, ordered such that the best cell is listed first using RSCP to order the cells if RSCP measurement results are available for cells on this frequency, otherwise using EcN0 to order the cells, based on measurements collected up to the moment the UE detected the failure, and for each cell that is included, include the optional fields that are available;
- 1> if the UE is in NR-DC:
 - 2> include and set *measResultSCG* in accordance with 5.7.3.4;
- 1> if the UE is in NE-DC:
 - 2> include and set measResultSCG-EUTRA in accordance with TS 36.331 [10] clause 5.6.13.5;
- NOTE 1: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Exclude-listed cells are not required to be reported.
- NOTE 2: Field *measResultSCG-Failure* is used to report available results for NR frequencies the UE is configured to measure by SCG RRC signalling.
- NOTE 3: Field *measResultSCG-EUTRA* is used to report available results for E-UTRAN frequencies the UE is configured to measure by E-UTRA RRC signalling.
- 1> if SRB1 is configured as split SRB and *pdcp-Duplication* is not configured:
 - 2> if the *primaryPath* for the PDCP entity of SRB1 refers to the MCG:
 - 3> set the *primaryPath* to refer to the SCG.

The UE shall:

- 1> start timer T316:
- 1> if SRB1 is configured as split SRB:
 - 2> submit the *MCGFailureInformation* message to lower layers for transmission via SRB1, upon which the procedure ends;
- 1> else (i.e. SRB3 configured):
 - 2> submit the *MCGFailureInformation* message to lower layers for transmission embedded in NR RRC message *ULInformationTransferMRDC* via SRB3 as specified in 5.7.2a.3.

5.7.3b.5 T316 expiry

The UE shall:

- 1> if T316 expires:
 - 2> initiate the connection re-establishment procedure as specified in 5.3.7.

5.7.4 UE Assistance Information

5.7.4.1 General

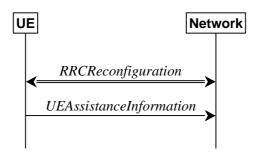


Figure 5.7.4.1-1: UE Assistance Information

The purpose of this procedure is for the UE to inform the network of:

- its delay budget report carrying desired increment/decrement in the connected mode DRX cycle length, or;
- its overheating assistance information, or;
- its IDC assistance information, or;
- its preference on DRX parameters for power saving, or;
- its preference on the maximum aggregated bandwidth for power saving, or;
- its preference on the maximum number of secondary component carriers for power saving, or;
- its preference on the maximum number of MIMO layers for power saving, or;
- its preference on the minimum scheduling offset for cross-slot scheduling for power saving, or;
- its preference on the RRC state, or;
- configured grant assistance information for NR sidelink communication, or;
- its preference in being provisioned with reference time information, or;
- its preference for FR2 UL gap, or;
- its preference to transition out of RRC_CONNECTED state for MUSIM operation, or;
- its preference on the MUSIM gaps, or;
- its relaxation state for RLM measurements, or;
- its relaxation state for BFD measurements, or;
- availability of data and/or signalling mapped to radio bearers which are not configured for SDT, or;
- its preference for the SCG to be deactivated, or;
- indicate that the UE has uplink data to transmit for a DRB for which there is no MCG RLC bearer while the SCG is deactivated, or;
- change of its fulfilment status for RRM measurement relaxation criterion, or;
- service link (specified in TS 38.300 [2]) propagation delay difference between serving cell and neighbour cell(s).

5.7.4.2 Initiation

A UE capable of providing delay budget report in RRC_CONNECTED may initiate the procedure in several cases, including upon being configured to provide delay budget report and upon change of delay budget preference.

A UE capable of providing overheating assistance information in RRC_CONNECTED may initiate the procedure if it was configured to do so, upon detecting internal overheating, or upon detecting that it is no longer experiencing an overheating condition.

A UE capable of providing IDC assistance information in RRC_CONNECTED may initiate the procedure if it was configured to do so, upon detecting IDC problem if the UE did not transmit an IDC assistance information since it was configured to provide IDC indications, or upon change of IDC problem information.

A UE capable of providing its preference on DRX parameters of a cell group for power saving in RRC_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a preference on DRX parameters and upon change of its preference on DRX parameters.

A UE capable of providing its preference on the maximum aggregated bandwidth of a cell group for power saving in RRC_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a maximum aggregated bandwidth preference and upon change of its maximum aggregated bandwidth preference.

A UE capable of providing its preference on the maximum number of secondary component carriers of a cell group for power saving in RRC_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a maximum number of secondary component carriers preference and upon change of its maximum number of secondary component carriers preference.

A UE capable of providing its preference on the maximum number of MIMO layers of a cell group for power saving in RRC_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a maximum number of MIMO layers preference and upon change of its maximum number of MIMO layers preference.

A UE capable of providing its preference on the minimum scheduling offset for cross-slot scheduling of a cell group for power saving in RRC_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a minimum scheduling offset preference and upon change of its minimum scheduling offset preference.

A UE capable of providing assistance information to transition out of RRC_CONNECTED state may initiate the procedure if it was configured to do so, upon determining that it prefers to transition out of RRC_CONNECTED state, or upon change of its preferred RRC state.

A UE capable of providing configured grant assistance information for NR sidelink communication in RRC_CONNECTED may initiate the procedure in several cases, including upon being configured to provide traffic pattern information and upon change of traffic patterns.

A UE capable of providing an indication of its preference in being provisioned with reference time information may initiate the procedure upon being configured to provide this indication, or if it was configured to provide this indication and upon change of its preference.

A UE capable of providing an indication of its preference in FR2 UL gap may initiate the procedure if it was configured to do so, upon detecting the need of FR2 UL gap activation/deactivation.

A UE capable of providing MUSIM assistance information for gap preference may initiate the procedure if it was configured to do so, upon determining it needs the gaps, or upon change of the gap preference information.

A UE capable of providing MUSIM assistance information for leave indication may initiate the procedure if it was configured to do so upon determining that it needs to leave RRC_CONNECTED state.

A UE capable of relaxing its RLM measurements of a cell group in RRC_CONNECTED state shall initiate the procedure for providing an indication of its relaxation state for RLM measurements upon being configured to do so, and upon change of its relaxation state for RLM measurements in RRC_CONNECTED state.

A UE capable of relaxing its BFD measurements in serving cells of a cell group in RRC_CONNECTED shall initiate the procedure for providing an indication of its relaxation state for BFD measurements upon being configured to do so, and upon change of its relaxation state for BFD measurements in RRC_CONNECTED state.

A UE capable of SDT initiates this procedure when data and/or signalling mapped to radio bearers that are not configured for SDT becomes available during SDT (i.e. while SDT procedure is ongoing).

A UE capable of providing its preference for SCG deactivation may initiate the procedure if it was configured to do so, upon determining that it prefers or does no more prefer the SCG to be deactivated.

A UE that has uplink data to transmit for a DRB for which there is no MCG RLC bearer while the SCG is deactivated shall initiate the procedure.

A UE capable of providing an indication of fulfilment of the RRM measurement relaxation criterion in connected mode may initiate the procedure if it was configured to do so, upon change of its fulfilment status for RRM measurement relaxation criterion for connected mode.

A UE capable of providing service link propagation delay difference between serving cell and neighbour cell(s) shall initiate the procedure upon being configured to do so, and upon determining that service link propagation delay difference between serving cell and a neighbour cell has changed more than *threshPropDelayDiff* compared with the last reported value.

Upon initiating the procedure, the UE shall:

- 1> if configured to provide delay budget report:
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *delayBudgetReport* since it was configured to provide delay budget report; or
 - 2> if the current delay budget is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *delayBudgetReport* and timer T342 is not running:
 - 3> start or restart timer T342 with the timer value set to the delayBudgetReportingProhibitTimer;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide a delay budget report;
- 1> if configured to provide overheating assistance information:
 - 2> if the overheating condition has been detected and T345 is not running; or
 - 2> if the current overheating assistance information is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *overheatingAssistance* and timer T345 is not running:
 - 3> start timer T345 with the timer value set to the *overheatingIndicationProhibitTimer*;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide overheating assistance information;
- 1> if configured to provide IDC assistance information:
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *idc-Assistance* since it was configured to provide IDC assistance information:
 - 3> if on one or more frequencies included in *candidateServingFreqListNR*, the UE is experiencing IDC problems that it cannot solve by itself; or
 - 3> if on one or more supported UL CA combination comprising of carrier frequencies included in *candidateServingFreqListNR*, the UE is experiencing IDC problems that it cannot solve by itself:
 - 4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide IDC assistance information:
 - 2> else if the current IDC assistance information is different from the one indicated in the last transmission of the *UEAssistanceInformation* message:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide IDC assistance information;
- NOTE 1: The term "IDC problems" refers to interference issues applicable across several subframes/slots where not necessarily all the subframes/slots are affected.

- NOTE 2: For the frequencies on which a serving cell or serving cells is configured that is activated, IDC problems consist of interference issues that the UE cannot solve by itself, during either active data exchange or upcoming data activity which is expected in up to a few hundred milliseconds.

 For frequencies on which a SCell or SCells is configured that is deactivated, reporting IDC problems indicates an anticipation that the activation of the SCell or SCells would result in interference issues that the UE would not be able to solve by itself.

 For a non-serving frequency, reporting IDC problems indicates an anticipation that if the non-serving
 - For a non-serving frequency, reporting IDC problems indicates an anticipation that if the non-serving frequency or frequencies became a serving frequency or serving frequencies then this would result in interference issues that the UE would not be able to solve by itself.
- 1> if configured to provide its preference on DRX parameters of a cell group for power saving:
 - 2> if the UE has a preference on DRX parameters of the cell group and the UE did not transmit a UEAssistanceInformation message with drx-Preference for the cell group since it was configured to provide its preference on DRX parameters of the cell group for power saving; or
 - 2> if the current *drx-Preference* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *drx-Preference* for the cell group and timer T346a associated with the cell group is not running:
 - 3> start the timer T346a with the timer value set to the drx-PreferenceProhibitTimer of the cell group;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *drx-Preference*;
- 1> if configured to provide its preference on the maximum aggregated bandwidth of a cell group for power saving:
 - 2> if the UE has a preference on the maximum aggregated bandwidth of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *maxBW-Preference* and/or *maxBW-PreferenceFR2-2* for the cell group since it was configured to provide its preference on the maximum aggregated bandwidth of the cell group for power saving; or
 - 2> if the current *maxBW-Preference* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *maxBW-Preference* and/or *maxBW-PreferenceFR2-2* for the cell group and timer T346b associated with the cell group is not running:
 - 3> start the timer T346b with the timer value set to the maxBW-PreferenceProhibitTimer of the cell group;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *maxBW-Preference* and/or *maxBW-PreferenceFR2-2*;
- 1> if configured to provide its preference on the maximum number of secondary component carriers of a cell group for power saving:
 - 2> if the UE has a preference on the maximum number of secondary component carriers of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *maxCC-Preference* for the cell group since it was configured to provide its preference on the maximum number of secondary component carriers of the cell group for power saving; or
 - 2> if the current *maxCC-Preference* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *maxCC-Preference* for the cell group and timer T346c associated with the cell group is not running:
 - 3> start the timer T346c with the timer value set to the maxCC-PreferenceProhibitTimer of the cell group;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *maxCC-Preference*;
- 1> if configured to provide its preference on the maximum number of MIMO layers of a cell group for power saving:
 - 2> if the UE has a preference on the maximum number of MIMO layers of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *maxMIMO-LayerPreference* and/or *maxMIMO-LayerPreferenceFR2-2* for the cell group since it was configured to provide its preference on the maximum number of MIMO layers of the cell group for power saving; or

- 2> if the current maxMIMO-LayerPreference information for the cell group is different from the one indicated in the last transmission of the UEAssistanceInformation message including maxMIMO-LayerPreference and/or maxMIMO-LayerPreferenceFR2-2 for the cell group and timer T346d associated with the cell group is not running:
 - 3> start the timer T346d with the timer value set to the *maxMIMO-LayerPreferenceProhibitTimer* of the cell group;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *maxMIMO-LayerPreference* and/or *maxMIMO-LayerPreferenceFR2-2*;
- 1> if configured to provide its preference on the minimum scheduling offset for cross-slot scheduling of a cell group for power saving:
 - 2> if the UE has a preference on the minimum scheduling offset for cross-slot scheduling of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *minSchedulingOffsetPreference* and/or *minSchedulingOffsetPreferenceExt* for the cell group since it was configured to provide its preference on the minimum scheduling offset for cross-slot scheduling of the cell group for power saving; or
 - 2> if the current minSchedulingOffsetPreference and/or minSchedulingOffsetPreferenceExt information for the cell group is different from the one indicated in the last transmission of the UEAssistanceInformation message including minSchedulingOffsetPreference and/or minSchedulingOffsetPreferenceExt for the cell group and timer T346e associated with the cell group is not running:
 - 3> start the timer T346e with the timer value set to the *minSchedulingOffsetPreferenceProhibitTimer* of the cell group;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *minSchedulingOffsetPreference* and/or *minSchedulingOffsetPreferenceExt*;
- 1> if configured to provide its release preference and timer T346f is not running:
 - 2> if the UE determines that it would prefer to transition out of RRC_CONNECTED state; or
 - 2> if the UE is configured with *connectedReporting* and the UE determines that it would prefer to revert an earlier indication to transition out of RRC_CONNECTED state:
 - 3> start timer T346f with the timer value set to the releasePreferenceProhibitTimer;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the release preference;
- 1> if configured to provide configured grant assistance information for NR sidelink communication:
 - 2> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide configured grant assistance information for NR sidelink communication;
- 1> if configured to provide preference in being provisioned with reference time information:
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *referenceTimeInfoPreference* since it was configured to provide preference; or
 - 2> if the UE's preference changed from the last time UE initiated transmission of the *UEAssistanceInformation* message including *referenceTimeInfoPreference*:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide preference in being provisioned with reference time information.
- 1> if configured to provide its preference on FR2 UL gap:
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *ul-GapFR2-Preference* since it was configured to provide its preference on FR2 UL gap information:
 - 3> if the UE has a preference on FR2 UL gap activation/deactivation:

- 4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide FR2 UL gap preference;
- 2> else if the current FR2 UL gap preference is different from the one indicated in the last transmission of the *UEAssistanceInformation* message:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide FR2 UL gap preference.
- 1> if configured to provide MUSIM assistance information for leaving RRC_CONNECTED:
 - 2> if the UE needs to leave RRC_CONNECTED state and the timer T346g is not running:
 - 3> initiate transmission of the UEAssistanceInformation message in accordance with 5.7.4.3 to provide MUSIM assistance information for leaving RRC_CONNECTED;
 - 3> start the timer T346g with the timer value set to the *musim-LeaveWithoutResponseTimer*;
- 1> if configured to provide MUSIM assistance information for gap preference:
 - 2> if the UE has a preference on the MUSIM gap(s) and the UE did not transmit a *UEAssistanceInformation* message with *musim-GapPreferenceList* since it was configured to provide MUSIM assistance information for gap preference; or
 - 2> if the current *musim-GapPreferenceList* is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *musim-GapPreferenceList* and the timer T346h is not running:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *musim-GapPreferenceList*;
 - 3> start or restart the timer T346h with the timer value set to the *musim-GapProhibitTimer*.
- NOTE 3: The UE does not need to initiate transmission of the *UEAssistanceInformation* message if the difference between the current *musim-GapPreferenceList* and the last transmission of the *UEAssistanceInformation* message including *musim-GapPreferenceList* is only due to removal of an ended aperiodic gap.
- 1> if configured to provide the relaxation state of RLM measurements of a cell group and RLM measurement of the cell group is not stopped:
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *rlm-MeasRelaxationState* since it was configured to provide the relaxation state of RLM measurements for the cell group; or
 - 2> if the relaxation state of RLM measurements for the cell group is currently different from the relaxation state reported in the last transmission of the *UEAssistanceInformation* message including *rlm-MeasRelaxationState* of the cell group and timer T346j associated with the cell group is not running:
 - 3> start timer T346j with the timer value set to the rlm-RelaxtionReportingProhibitTimer;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the relaxation state of RLM measurements of the cell group;
- 1> if configured to provide the relaxation state of BFD measurements of serving cells of a cell group and BFD measurement of the cell group is not stopped:
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *bfd-MeasRelaxationState* since it was configured to provide the relaxation state of BFD measurements for the cell group; or
 - 2> if the relaxation state of BFD measurements in any serving cell of the cell group is currently different from the relaxation state reported in the last transmission of the *UEAssistanceInformation* message including *bfd-MeasRelaxationState* of the cell group and timer T346k associated with the cell group is not running:
 - 3> start timer T346k with the timer value set to the bfd-RelaxtionReportingProhibitTimer;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the relaxation state of BFD measurements of serving cells of the cell group.

- 1> if data and/or signalling mapped to radio bearers not configured for SDT becomes available during SDT (i.e. while SDT procedure is ongoing):
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *nonSDT-DataIndication* since the initiation of the current resume procedure for SDT:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide *nonSDT-DataIndication*.
- 1> if configured to provide its preference for SCG deactivation and timer T346i is not running;
 - 2> if the UE prefers the SCG to be deactivated and did not transmit a *UEAssistanceInformation* message with *scg-DeactivationPreference* since it was configured to provide its SCG deactivation preference; or
 - 2> if the UE preference for SCG deactivation is different from the last indicated scg-DeactivationPreference:
 - 3> start timer T346i with the timer value set to the scg-DeactivationPreferenceProhibitTimer;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the UE preference for SCG deactivation;
- 1> if the SCG is deactivated, and,
- 1> the UE has uplink data to send for an SCG RLC entity while the UE previously did not have any uplink data to send for any SCG RLC entity:
 - 2> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to indicate that the UE has uplink data to send for a DRB whose *DRB-Identity* is not included in any *RLC-BearerConfig* in the *CellGroupConfig* associated with the MCG.
- 1> if configured to send indications of RRM measurement relaxation criterion fulfilment:
 - 2> if the criterion in 5.7.4.4 is met for a period of T_{SearchDeltaP-StationaryConnected}:
 - 3> if the UE did not transmit a *UEAssistanceInformation* message with *rrm-MeasRelaxationFulfilment* as *true* since it was configured to provide indications of RRM measurement relaxation criterion fulfilment; or
 - 3> the last *UEAssistanceInformation* message indicated the criterion in 5.7.4.4 is not fulfilled with *rrm-MeasRelaxationFulfilment* as *false*:
 - 4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to indicate that the criterion for RRM measurement relaxation for connected mode is fulfilled;

2> else:

- 3> if the last *UEAssistanceInformation* message indicated fulfilment of the criterion in 5.7.4.4 with *rrm-MeasRelaxationFulfilment* as *true*:
 - 4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to indicate that the criterion for RRM measurement relaxation for connected mode is not fulfilled.
- 1> if configured to provide service link propagation delay difference between serving cell and neighbour cell(s);
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *propagationDelayDifference* since it was configured to provide service link propagation delay difference between serving cell and neighbour cell(s); or
 - 2> for any neighbour cell in *neighCellInfoList*, if the service link propagation delay difference between serving cell and the neighbour cell has changed more than *threshPropDelayDiff* since the last transmission of the *UEAssistanceInformation* message including *propagationDelayDifference*:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide service link propagation delay difference between serving cell and each neighbour cell included in the *neighCellInfoList*;

5.7.4.3 Actions related to transmission of *UEAssistanceInformation* message

The UE shall set the contents of the UEAssistanceInformation message as follows:

- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide a delay budget report according to 5.7.4.2 or 5.3.5.3;
 - 2> set delayBudgetReport to type1 according to a desired value;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide overheating assistance information according to 5.7.4.2 or 5.3.5.3;
 - 2> if the UE experiences internal overheating:
 - 3> if the UE prefers to temporarily reduce the number of maximum secondary component carriers:
 - 4> include reducedMaxCCs in the OverheatingAssistance IE;
 - 4> set *reducedCCsDL* to the number of maximum SCells the UE prefers to be temporarily configured in downlink;
 - 4> set *reducedCCsUL* to the number of maximum SCells the UE prefers to be temporarily configured in uplink;
 - 3> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR1:
 - 4> include reducedMaxBW-FR1 in the OverheatingAssistance IE;
 - 4> set *reducedBW-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR1;
 - 4> set *reducedBW-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR1;
 - 3> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR2-1:
 - 4> include reducedMaxBW-FR2 in the OverheatingAssistance IE;
 - 4> set *reducedBW-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR2-1;
 - 4> set *reducedBW-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR2-1;
 - 3> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR2-2:
 - 4> include reducedMaxBW-FR2-2 in the OverheatingAssistance IE;
 - 4> set *reducedBW-FR2-2-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR2-2;
 - 4> set *reducedBW-FR2-2-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR2-2;
 - 3> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR1:
 - 4> include reducedMaxMIMO-LayersFR1 in the OverheatingAssistance IE;
 - 4> set *reducedMIMO-LayersFR1-DL* to the number of maximum MIMO layers of each serving cell operating on FR1 the UE prefers to be temporarily configured in downlink;
 - 4> set *reducedMIMO-LayersFR1-UL* to the number of maximum MIMO layers of each serving cell operating on FR1 the UE prefers to be temporarily configured in uplink;
 - 3> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR2-1:

- 4> include reducedMaxMIMO-LayersFR2 in the OverheatingAssistance IE;
- 4> set reducedMIMO-LayersFR2-DL to the number of maximum MIMO layers of each serving cell operating on FR2-1 the UE prefers to be temporarily configured in downlink;
- 4> set *reducedMIMO-LayersFR2-UL* to the number of maximum MIMO layers of each serving cell operating on FR2-1 the UE prefers to be temporarily configured in uplink;
- 3> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR2-2:
- 4> include reducedMaxMIMO-LayersFR2-2 in the OverheatingAssistance IE;
- 4> set *reducedMIMO-LayersFR2-2-DL* to the number of maximum MIMO layers of each serving cell operating on FR2 the UE prefers to be temporarily configured in downlink;
- 4> set *reducedMIMO-LayersFR2-2-UL* to the number of maximum MIMO layers of each serving cell operating on FR2 the UE prefers to be temporarily configured in uplink;
- 2> else (if the UE no longer experiences an overheating condition):
 - 3> do not include reducedMaxCCs, reducedMaxBW-FR1, reducedMaxBW-FR2, reducedMaxBW-FR2-2, reducedMaxMIMO-LayersFR1, reducedMaxMIMO-LayersFR2 or reducedMaxMIMO-LayersFR2-2 in OverheatingAssistance IE;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide IDC assistance information according to 5.7.4.2 or 5.3.5.3:
 - 2> if there is at least one carrier frequency included in *candidateServingFreqListNR*, the UE is experiencing IDC problems that it cannot solve by itself:
 - 3> include the field *affectedCarrierFreqList* with an entry for each affected carrier frequency included in *candidateServingFreqListNR*;
 - 3> for each carrier frequency included in the field *affectedCarrierFreqList*, include *interferenceDirection* and set it accordingly;
 - 2> if there is at least one supported UL CA combination comprising of carrier frequencies included in *candidateServingFreqListNR*, the UE is experiencing IDC problems that it cannot solve by itself:
 - 3> include *victimSystemType* for each UL CA combination included in *affectedCarrierFreqCombList*;
 - 3> if the UE sets *victimSystemType* to *wlan* or *bluetooth*:
 - 4> include *affectedCarrierFreqCombList* with an entry for each supported UL CA combination comprising of carrier frequencies included in *candidateServingFreqListNR*, that is affected by IDC problems;
 - 3> else:
 - 4> optionally include *affectedCarrierFreqCombList* with an entry for each supported UL CA combination comprising of carrier frequencies included in *candidateServingFreqListNR*, that is affected by IDC problems;
- NOTE 1: When sending an *UEAssistanceInformation* message to inform the IDC problems, the UE includes all IDC assistance information (rather than providing e.g. the changed part(s) of the IDC assistance information).
- NOTE 2: Upon not anymore experiencing a particular IDC problem that the UE previously reported, the UE provides an IDC indication with the modified contents of the *UEAssistanceInformation* message (e.g. by not including the IDC assistance information in the *idc-Assistance* field).
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide *drx-Preference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:
 - 2> include drx-Preference in the UEAssistanceInformation message;

- 2> if the UE has a preference on DRX parameters for the cell group:
 - 3> if the UE has a preference for the long DRX cycle:
 - 4> include preferredDRX-LongCycle in the DRX-Preference IE and set it to the preferred value;
 - 3> if the UE has a preference for the DRX inactivity timer:
 - 4> include preferredDRX-InactivityTimer in the DRX-Preference IE and set it to the preferred value;
 - 3> if the UE has a preference for the short DRX cycle:
 - 4> include preferredDRX-ShortCycle in the DRX-Preference IE and set it to the preferred value;
 - 3> if the UE has a preference for the short DRX timer:
 - 4> include preferredDRX-ShortCycleTimer in the DRX-Preference IE and set it to the preferred value;
- 2> else (if the UE has no preference on DRX parameters for the cell group):
 - 3> do not include *preferredDRX-LongCycle*, *preferredDRX-InactivityTimer*, *preferredDRX-ShortCycle* and *preferredDRX-ShortCycleTimer* in the *DRX-Preference* IE;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxBW-Preference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:
 - 2> include maxBW-Preference in the UEAssistanceInformation message;
 - 2> if the UE has a preference on the maximum aggregated bandwidth for the cell group:
 - 3> if the UE prefers to reduce the maximum aggregated bandwidth of FR1:
 - 4> include reducedMaxBW-FR1 in the MaxBW-Preference IE;
 - 4> set *reducedBW-DL* to the maximum aggregated bandwidth the UE desires to have configured across all downlink carriers of FR1 in the cell group;
 - 4> set *reducedBW-UL* to the maximum aggregated bandwidth the UE desires to have configured across all uplink carriers of FR1 in the cell group;
 - 3> if the UE prefers to reduce the maximum aggregated bandwidth of FR2-1:
 - 4> include reducedMaxBW-FR2 in the MaxBW-Preference IE;
 - 4> set *reducedBW-DL* to the maximum aggregated bandwidth the UE desires to have configured across all downlink carriers of FR2-1 in the cell group;
 - 4> set *reducedBW-UL* to the maximum aggregated bandwidth the UE desires to have configured across all uplink carriers of FR2-1 in the cell group;
 - 2> else (if the UE has no preference on the maximum aggregated bandwidth for the cell group):
 - 3> do not include reducedMaxBW-FR1 and reducedMaxBW-FR2 in the MaxBW-Preference IE;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxBW-PreferenceFR2-2* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:
 - 2> include maxBW-PreferenceFR2-2 in the UEAssistanceInformation message;
 - 3> if the UE prefers to reduce the maximum aggregated bandwidth of FR2-2:
 - 4> include reducedMaxBW-FR2-2 in the MaxBW-PreferenceFR2-2 IE;
 - 4> set *reducedBW-FR2-2-DL* to the maximum aggregated bandwidth the UE desires to have configured across all downlink carriers of FR2-2 in the cell group;
 - 4> set *reducedBW-FR2-2-UL* to the maximum aggregated bandwidth the UE desires to have configured across all uplink carriers of FR2-2 in the cell group;

- 2> else (if the UE has no preference on the maximum aggregated bandwidth for the cell group):
 - 3> do not include reducedMaxBW-FR2-2 in the MaxBW-PreferenceFR2-2 IE;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxCC-Preference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:
 - 2> include maxCC-Preference in the UEAssistanceInformation message;
 - 2> if the UE has a preference on the maximum number of secondary component carriers for the cell group:
 - 3> include reducedMaxCCs in the MaxCC-Preference IE;
 - 3> set *reducedCCsDL* to the number of maximum SCells the UE desires to have configured in downlink in the cell group;
 - 3> set *reducedCCsUL* to the number of maximum SCells the UE desires to have configured in uplink in the cell group;
 - 2> else (if the UE has no preference on the maximum number of secondary component carriers for the cell group):
 - 3> do not include reducedMaxCCs in the MaxCC-Preference IE;
- NOTE 3: The UE can implicitly indicate a preference for NR SCG release by reporting the maximum aggregated bandwidth preference for power saving of the cell group, if configured, as zero for both FR1 and FR2, and by reporting the maximum number of secondary component carriers for power saving of the cell group, if configured, as zero for both uplink and downlink.
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxMIMO-LayerPreference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:
 - 2> include maxMIMO-LayerPreference in the UEAssistanceInformation message;
 - 2> if the UE has a preference on the maximum number of MIMO layers for the cell group:
 - 3> if the UE prefers to reduce the number of maximum MIMO layers of each serving cell operating on FR1:
 - 4> include reducedMaxMIMO-LayersFR1 in the MaxMIMO-LayerPreference IE;
 - 4> set *reducedMIMO-LayersFR1-DL* to the preferred maximum number of downlink MIMO layers of each BWP of each FR1 serving cell that the UE operates on in the cell group;
 - 4> set *reducedMIMO-LayersFR1-UL* to the preferred maximum number of uplink MIMO layers of each FR1 serving cell that the UE operates on in the cell group;
 - 3> if the UE prefers to reduce the number of maximum MIMO layers of each serving cell operating on FR2-1:
 - 4> include reducedMaxMIMO-LayersFR2 in the MaxMIMO-LayerPreference IE;
 - 4> set *reducedMIMO-LayersFR2-DL* to the preferred maximum number of downlink MIMO layers of each BWP of each FR2-1 serving cell that the UE operates on in the cell group;
 - 4> set *reducedMIMO-LayersFR2-UL* to the preferred maximum number of uplink MIMO layers of each FR2-1 serving cell that the UE operates on in the cell group;
 - 2> else (if the UE has no preference on the maximum number of MIMO layers for the cell group):
 - 3> do not include reducedMaxMIMO-LayersFR1 and reducedMaxMIMO-LayersFR2 in the MaxMIMO-LayerPreference IE;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxMIMO LayerPreferenceFR2* 2 of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:
 - 2> include maxMIMO-LayerPreferenceFR2-2 in the UEAssistanceInformation message;

- 2> if the UE has a preference on the maximum number of MIMO layers for the cell group for FR2-2:
 - 3> if the UE prefers to reduce the number of maximum MIMO layers of each serving cell operating on FR2 2:
 - 4> include reducedMaxMIMO-LayersFR2-2 in the MaxMIMO-LayerPreferenceFR2 2 IE;
 - 4> set *reducedMIMO-LayersFR2-2-DL* to the preferred maximum number of downlink MIMO layers of each BWP of each FR2-2 serving cell that the UE operates on in the cell group;
 - 4> set *reducedMIMO-LayersFR2-2-UL* to the preferred maximum number of uplink MIMO layers of each FR2-2 serving cell that the UE operates on in the cell group;
- 2> else (if the UE has no preference on the maximum number of MIMO layers for the cell group):
 - 3> do not include reducedMaxMIMO-LayersFR2-2 in the MaxMIMO-LayerPreferenceFR2-2 IE;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide *minSchedulingOffsetPreference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:
 - 2> include minSchedulingOffsetPreference in the UEAssistanceInformation message;
 - 2> if the UE has a preference on the minimum scheduling offset for cross-slot scheduling for the cell group:
 - 3> if the UE has a preference for the value of K₀ (TS 38.214 [19], clause 5.1.2.1) for cross-slot scheduling with 15 kHz SCS:
 - 4> include preferredKO-SCS-15kHz in the MinSchedulingOffsetPreference IE and set it to the desired value of K_0 :
 - 3> if the UE has a preference for the value of K₀ for cross-slot scheduling with 30 kHz SCS:
 - 4> include preferredKO-SCS-30kHz in the MinSchedulingOffsetPreference IE and set it to the desired value of K_0 :
 - 3> if the UE has a preference for the value of K_0 for cross-slot scheduling with 60 kHz SCS:
 - 4> include preferredKO-SCS-60kHz in the MinSchedulingOffsetPreference IE and set it to the desired value of K_0 ;
 - 3> if the UE has a preference for the value of K₀ for cross-slot scheduling with 120 kHz SCS:
 - 4> include preferredK0-SCS-120kHz in the MinSchedulingOffsetPreference IE and set it to the desired value of K_0 ;
 - 3> if the UE has a preference for the value of K_2 (TS 38.214 [19], clause 6.1.2.1) for cross-slot scheduling with 15 kHz SCS:
 - 4> include preferredK2-SCS-15kHz in the MinSchedulingOffsetPreference IE and set it to the desired value of K_2 ;
 - 3> if the UE has a preference for the value of K_2 for cross-slot scheduling with 30 kHz SCS:
 - 4> include *preferredK2-SCS-30kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of *K*₂;
 - 3> if the UE has a preference for the value of K₂ for cross-slot scheduling with 60 kHz SCS:
 - 4> include *preferredK2-SCS-60kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of *K*₂;
 - 3> if the UE has a preference for the value of K_2 for cross-slot scheduling with 120 kHz SCS:
 - 4> include preferredK2-SCS-120kHz in the MinSchedulingOffsetPreference IE and set it to the desired value of K_2 ;

- 2> else (if the UE has no preference on the minimum scheduling offset for cross-slot scheduling for the cell group):
 - 3> do not include preferredK0 and preferredK2 in the MinSchedulingOffsetPreference IE;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide *minSchedulingOffsetPreferenceExt* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:
 - 2> include minSchedulingOffsetPreferenceExt in the UEAssistanceInformation message;
 - 2> if the UE has a preference on the minimum scheduling offset for cross-slot scheduling for the cell group for FR2-2:
 - 3> include minSchedulingOffsetPreferenceExt in the UEAssistanceInformation message;
 - 4> if the UE has a preference for the value of K_0 (TS 38.214 [19], clause 5.1.2.1) for cross-slot scheduling with 480 kHz SCS:
 - 5> include preferredKO-SCS-480kHz in the minSchedulingOffsetPreferenceExt IE and set it to the desired value of K_0 ;
 - 4> if the UE has a preference for the value of K₀ for cross-slot scheduling with 960 kHz SCS:
 - 5> include preferredK0-SCS-960kHz in the minSchedulingOffsetPreferenceExt IE and set it to the desired value of K_0 ;
 - 4> if the UE has a preference for the value of K₂ for cross-slot scheduling with 480 kHz SCS:
 - 5> include preferredK2-SCS-480kHz in the minSchedulingOffsetPreferenceExt IE and set it to the desired value of K₂;
 - 4> if the UE has a preference for the value of K₂ for cross-slot scheduling with 960 kHz SCS:
 - 5> include *preferredK2-SCS-960kHz* in the *minSchedulingOffsetPreferenceExt* IE and set it to the desired value of K₂:
 - 3> else (if the UE has no preference on the minimum scheduling offset for cross-slot scheduling for the cell group):
 - 4> do not include preferredK0 and preferredK2 in the minSchedulingOffsetPreferenceExt IE;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide a release preference according to 5.7.4.2 or 5.3.5.3:
 - 2> include releasePreference in the UEAssistanceInformation message;
 - 2> set preferredRRC-State to the desired RRC state on transmission of the UEAssistanceInformation message;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide an indication of preference in being provisioned with reference time information according to 5.7.4.2 or 5.3.5.3:
 - 2> if the UE has a preference in being provisioned with reference time information:
 - 3> set referenceTimeInfoPreference to true;
 - 2> else:
 - 3> set referenceTimeInfoPreference to false.
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide preference on FR2 UL gap according to 5.7.4.2 or 5.3.5.3:
 - 2> if the UE has a preference for FR2 UL gap configuration:
 - 3> set *ul-GapFR2-PatternPreference* to the preferred FR2 UL gap pattern;
 - 2> else (if the UE has no preference for the FR2 UL gap configuration):

- 3> do not include *ul-GapFR2-PatternPreference* in the *UL-GapFR2-Preference* IE.
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide MUSIM assistance information according to 5.7.4.2 or 5.3.5.3:
 - 2> if the UE has a preference for MUSIM periodic gap(s):
 - 3> include musim-GapPreferenceList with an entry for each periodic gap the UE prefers to be configured;
 - 4> set *musim-GapLength* and *musim-GapRepetitionAndOffset* in the *musim-GapInfo* IE to the values of the length and the repetition/offset of the gap(s), respectively, the UE prefers to be configured with;
 - 2> if the UE has a preference for MUSIM aperiodic gap:
 - 3> include the field *musim-GapPreferenceList*, with one entry for the aperiodic gap the UE prefers to be configured;
 - 4> include *musim-GapLength* in the *musim-GapInfo* IE and set it to the values of the length of the gap the UE prefers to be configured with;
 - 4> optionally include *musim-Starting-SFN-AndSubframe* in the *musim-GapInfo* IE and set it to the starting SFN/subframe of the gap the UE prefers to be configured with;
 - 2> if the UE has no longer preference for the periodic/aperiodic gaps:
 - 3> do not include musim-GapPreferenceList in the musim-Assistance IE;
 - 2> if UE has a preference to leave RRC_CONNECTED state:
 - 3> set *musim-PreferredRRC-State* to the preferred RRC state.
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide the relaxation state of RLM measurements of a cell group according to 5.7.4.2:
 - 2> if the UE performs RLM measurement relaxation on the cell group according to TS 38.133 [14]:
 - 3> set the rlm-MeasRelaxationState to true;
 - 2> else:
 - 3> set the *rlm-MeasRelaxationState* to *false*;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide the relaxation state of BFD measurements of a cell group:
 - 2> for each serving cell of the cell group:
 - 3> if the UE performs BFD measurement relaxation on this serving cell according to TS 38.133 [14]:
 - 4> set the n-th bit of *bfd-MeasRelaxationState* to '1', where n is equal to the *servCellIndex* value + 1 of the serving cell;
 - 3> else:
 - 4> set the n-th bit of *bfd-MeasRelaxationState* to '0', where n is equal to the *servCellIndex* value + 1 of the serving cell.
- 1> if transmission of the *UEAssistanceInformation* message is initiated to indicate availability of data mapped to radio bearers not configured for SDT according to 5.7.4.2:
 - 2> include the nonSDT-DataIndication in the UEAssistanceInformation message;
 - 2> include and set the resumeCause according to the information received from the upper layers, if provided.
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide an indication of preference for SCG deactivation according to 5.7.4.2:
 - 2> include scg-DeactivationPreference in the UEAssistanceInformation message;

- 2> set the *scg-DeactivationPreference* to *scgDeactivationPreferred* if the UE prefers the SCG to be deactivated, otherwise set it to *noPreference*;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide an indication that the UE has uplink data related to a deactivated SCG according to 5.7.4.2:
 - 2> include *uplinkData* in the *UEAssistanceInformation* message.
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide an indication about whether the criterion for RRM relaxation for connected mode is fulfilled or not fulfilled:
 - 2> if the criterion for RRM measurement relaxation for connected mode is fulfilled:
 - 3> set the *rrm-MeasRelaxationFulfilment* to *true*;
 - 2> else:
 - 3> set the *rrm-MeasRelaxationFulfilment* to *false*.
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide the service link propagation delay difference between serving cell and neighbour cell(s) according to 5.7.4.2;
 - 2> include the propagationDelayDifference for each neighbour cell in the neighCellInfoList;

The UE shall set the contents of the *UEAssistanceInformation* message for configured grant assistance information for NR sidelink communication:

- 1> if configured to provide configured grant assistance information for NR sidelink communication:
 - 2> include the *sl-UE-AssistanceInformationNR*;
- NOTE 4: It is up to UE implementation when and how to trigger configured grant assistance information for NR sidelink communication.

The UE shall:

- 1> if the procedure was triggered to provide configured grant assistance information for NR sidelink communication by an NR *RRCReconfiguration* message that was embedded within an E-UTRA *RRCConnectionReconfiguration*:
 - 2> submit the *UEAssistanceInformation* to lower layers via SRB1, embedded in E-UTRA RRC message *ULInformationTransferIRAT* as specified in TS 36.331 [10], clause 5.6.28;
- 1> else if the procedure was triggered to provide UE preference for SCG deactivation or to indicate that the UE with a deactivate SCG has uplink data to send on a DRB for which there is no MCG RLC bearer:
 - 2> submit the UEAssistanceInformation via SRB1 to lower layers for transmission;
- 1> else if the UE is in (NG)EN-DC:
 - 2> if SRB3 is configured and the SCG is not deactivated:
 - 3> submit the *UEAssistanceInformation* message via SRB3 to lower layers for transmission;
 - 2> else:
 - 3> submit the *UEAssistanceInformation* message via the E-UTRA MCG embedded in E-UTRA RRC message *ULInformationTransferMRDC* as specified in TS 36.331 [10].
- 1> else if the UE is in NR-DC:
 - 2> if the UE assistance configuration that triggered this UE assistance information is associated with the SCG:
 - 3> if SRB3 is configured and the SCG is not deactivated:
 - 4> submit the UEAssistanceInformation message via SRB3 to lower layers for transmission;
 - 3> else:

4> submit the *UEAssistanceInformation* message via the NR MCG embedded in NR RRC message *ULInformationTransferMRDC* as specified in 5.7.2a.3;

2> else:

3> submit the *UEAssistanceInformation* message via SRB1 to lower layers for transmission;

1> else:

2> submit the *UEAssistanceInformation* message to lower layers for transmission.

5.7.4.3a Setting the contents of *OverheatingAssistance* IE

The UE shall set the contents of *OverheatingAssistance* IE if initiated to provide overheating assistance indication for SCG in (NG)EN-DC according to clause 5.6.10.3 as specified in TS 36.331 [10]:

- 1> if the UE prefers to temporarily reduce the number of maximum secondary component carriers for SCG:
 - 2> include reducedMaxCCs in the OverheatingAssistance IE;
 - 2> set *reducedCCsDL* to the number of maximum SCells of the SCG the UE prefers to be temporarily configured in downlink;
 - 2> set *reducedCCsUL* to the number of maximum SCells of the SCG the UE prefers to be temporarily configured in uplink;
- 1> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR1 for SCG:
 - 2> include reducedMaxBW-FR1 in the OverheatingAssistance IE;
 - 2> set *reducedBW-FR1-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR1 of the SCG;
 - 2> set *reducedBW-FR1-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR1 of the SCG;
- 1> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR2-1 for SCG:
 - 2> include reducedMaxBW-FR2 in the OverheatingAssistance IE;
 - 2> set *reducedBW-FR2-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR2-1 of the SCG;
 - 2> set *reducedBW-FR2-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR2-1 of the SCG;
- 1> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR2-2 for SCG:
 - 2> include reducedMaxBW-FR2-2 in the OverheatingAssistance IE;
 - 2> set *reducedBW-FR2-2-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR2-2 of the SCG;
 - 2> set *reducedBW-FR2-2-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR2-2 of the SCG;
- 1> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR1 for SCG:
 - 2> include reducedMaxMIMO-LayersFR1 in the OverheatingAssistance IE;
 - 2> set *reducedMIMO-LayersFR1-DL* to the number of maximum MIMO layers of each serving cell operating on FR1 of the SCG the UE prefers to be temporarily configured in downlink;
 - 2> set *reducedMIMO-LayersFR1-UL* to the number of maximum MIMO layers of each serving cell operating on FR1 of the SCG the UE prefers to be temporarily configured in uplink;

- 1> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR2-1 for SCG:
 - 2> include reducedMaxMIMO-LayersFR2 in the OverheatingAssistance IE;
 - 2> set *reducedMIMO-LayersFR2-DL* to the number of maximum MIMO layers of each serving cell operating on FR2-1 of the SCG the UE prefers to be temporarily configured in downlink;
 - 2> set *reducedMIMO-LayersFR2-UL* to the number of maximum MIMO layers of each serving cell operating on FR2-1 of the SCG the UE prefers to be temporarily configured in uplink;
- 1> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR2-2 for SCG:
 - 2> include reducedMaxMIMO-LayersFR2-2 in the OverheatingAssistance IE;
 - 2> set *reducedMIMO-LayersFR2-2-DL* to the number of maximum MIMO layers of each serving cell operating on FR2-2 of the SCG the UE prefers to be temporarily configured in downlink;
 - 2> set *reducedMIMO-LayersFR2-2-UL* to the number of maximum MIMO layers of each serving cell operating on FR2-2 of the SCG the UE prefers to be temporarily configured in uplink;

5.7.4.4 Relaxed measurement criterion for a stationary RedCap UE

The relaxed measurement criterion for a stationary UE is met when:

 $- \quad (SS-RSRP_{RefStationaryConnected} - SS-RSRP) < S_{SearchDeltaP-StationaryConnected}, \\$

Where:

- SS-RSRP = current L3 RSRP measurement of the PCell based on SSB (dB).
- $SS-RSRP_{RefStationaryConnected}$ = reference SS-RSRP value of the PCell (dB), set as follows:
 - at the end of RRC reconfiguration procedure as specified in 5.3.5.3, when *rrm-MeasRelaxationReportingConfig* is included in the *RRCReconfiguration* message; or
 - after MAC successfully completes a Random Access procedure after applying a *reconfigurationWithSync* in *spCellConfig* while stationary criterion is configured; or
 - if (SS-RSRP SS-RSRP_{RefStationaryConnected}) > 0; or
 - if the relaxed measurement criterion has not been met for $T_{SearchDeltaP-StationaryConnected}$:
 - UE shall set the value of SS-RSRP_{RefStationaryConnected} to the current SS-RSRP value of the serving cell.

5.7.4a Void

5.7.5 Failure information

5.7.5.1 General

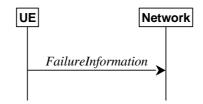


Figure 5.7.5.1-1: Failure information

The purpose of this procedure is to inform the network about a failure detected by the UE.

5.7.5.2 Initiation

A UE initiates the procedure when there is a need inform the network about a failure detected by the UE. In particular, the UE initiates the procedure when the following condition is met:

- 1> upon detecting failure for an RLC bearer, in accordance with 5.3.10.3;
- 1> upon detecting DAPS handover failure, in accordance with 5.3.5.8.3;

Upon initiating the procedure, the UE shall:

1> initiate transmission of the *FailureInformation* message as specified in 5.7.5.3;

5.7.5.3 Actions related to transmission of *FailureInformation* message

The UE shall:

- 1> if initiated to provide RLC failure information, set FailureInfoRLC-Bearer as follows:
 - 2> set logicalChannelIdentity to the logical channel identity of the failing RLC bearer;
 - 2> set *cellGroupId* to the cell group identity of the failing RLC bearer;
 - 2> set the *failureType* as *rlc-failure*;
- 1> if initiated to provide DAPS failure information, set *FailureInfoDAPS* as follows:
 - 2> set the failureType as daps-failure;
- 1> if used to inform the network about a failure for an MCG RLC bearer or DAPS failure information:
 - 2> submit the FailureInformation message to lower layers for transmission via SRB1;
- 1> else if used to inform the network about a failure for an SCG RLC bearer:
 - 2> if SRB3 is configured;
 - 3> submit the FailureInformation message to lower layers for transmission via SRB3;
 - 2> else:
 - 3> if the UE is in (NG)EN-DC:
 - 4> submit the *FailureInformation* message via E-UTRA SRB1 embedded in E-UTRA RRC message *ULInformationTransferMRDC* as specified in TS 36.331 [10].
 - 3> else if the UE is in NR-DC:
 - 4> submit the *FailureInformation* message via SRB1 embedded in NR RRC message *ULInformationTransferMRDC* as specified in clause 5.7.2a.3.

5.7.6 DL message segment transfer

5.7.6.1 General



Figure 5.7.6.1-1: DL message segment transfer

The purpose of this procedure is to transfer segments of DL DCCH messages from the network to the UE.

NOTE: The segmentation of DL DCCH message is only applicable to *RRCReconfiguration* and *RRCResume* messages in this release.

5.7.6.2 Initiation

The network initiates the DL Dedicated Message Segment transfer procedure whenever the encoded RRC message PDU exceeds the maximum PDCP SDU size. The network initiates the DL Dedicated Message Segment transfer procedure by sending the *DLDedicatedMessageSegment* message.

5.7.6.3 Reception of *DLDedicatedMessageSegment* by the UE

Upon receiving DLDedicatedMessageSegment message, the UE shall:

- 1> store the segment included in *rrc-MessageSegmentContainer*;
- 1> if all segments of the message have been received:
 - 2> assemble the message from the received segments and process the message according to 5.3.5.3 for the *RRCReconfiguration* message or 5.3.13.4 for the *RRCResume* message;
 - 2> discard all segments.

5.7.7 UL message segment transfer

5.7.7.1 General



Figure 5.7.7.1-1: UL message segment transfer

The purpose of this procedure is to transfer segments of UL DCCH messages from UE to a NG-RAN in RRC CONNECTED.

NOTE: The segmentation of UL DCCH message is only applicable to *UECapabilityInformation* and *MeasurementReportAppLayer* in this release.

5.7.7.2 Initiation

A UE capable of UL RRC message segmentation in RRC_CONNECTED will initiate the procedure when the following conditions are met:

- 1> if the RRC message segmentation is enabled based on the field rrc-SegAllowed received, and
- 1> if the encoded RRC message is larger than the maximum supported size of a PDCP SDU specified in TS 38.323 [5];

Upon initiating the procedure, the UE shall:

1> initiate transmission of the *ULDedicatedMessageSegment* message as specified in 5.7.7.3;

5.7.7.3 Actions related to transmission of *ULDedicatedMessageSegment* message

The UE shall segment the encoded RRC PDU based on the maximum supported size of a PDCP SDU specified in TS 38.323 [5]. UE shall minimize the number of segments and set the contents of the *ULDedicatedMessageSegment* messages as follows:

- 1> F or each new UL DCCH message, set the *segmentNumber* to 0 for the first message segment and increment the *segmentNumber* for each subsequent RRC message segment;
- 1> set *rrc-MessageSegmentContainer* to include the segment of the UL DCCH message corresponding to the *segmentNumber*;
- 1> if the segment included in the rrc-MessageSegmentContainer is the last segment of the UL DCCH message:
 - 2> set the rrc-MessageSegmentType to lastSegment;
- 1> else:
 - 2> set the *rrc-MessageSegmentType* to *notLastSegment*;
- 1> submit all the *ULDedicatedMessageSegment* messages generated for the segmented RRC message to lower layers for transmission in ascending order based on the *segmentNumber*, upon which the procedure ends.

5.7.8 Idle/inactive Measurements

5.7.8.1 General

This procedure specifies the measurements to be performed and stored by a UE in RRC_IDLE and RRC_INACTIVE when it has an idle/inactive measurement configuration.

5.7.8.1a Measurement configuration

The purpose of this procedure is to update the idle/inactive measurement configuration.

The UE initiates this procedure while T331 is running and SDT procedure is not ongoing and one of the following conditions is met:

- 1> upon selecting a cell when entering RRC_IDLE or RRC-INACTIVE from RRC_CONNECTED or RRC_INACTIVE; or
- 1> upon update of system information (SIB4, or SIB11), e.g. due to intra-RAT cell (re)selection;

While in RRC_IDLE or RRC_INACTIVE, and T331 is running, the UE shall:

- 1> if VarMeasIdleConfig includes neither a measIdleCarrierListEUTRA nor a measIdleCarrierListNR received from the RRCRelease message:
 - 2> if the UE supports *idleInactiveEUTRA-MeasReport*:
 - 3> if the SIB11 includes the measIdleConfigSIB and contains measIdleCarrierListEUTRA:
 - 4> store or replace the *measIdleCarrierListEUTRA* of *measIdleConfigSIB* of SIB11 within *VarMeasIdleConfig*;
 - 3> else:
 - 4> remove the *measIdleCarrierListEUTRA* in *VarMeasIdleConfig*, if stored;
 - 2> if the UE supports *idleInactiveNR-MeasReport*:
 - 3> if SIB11 includes the measIdleConfigSIB and contains measIdleCarrierListNR:
 - 4> store or replace the *measIdleCarrierListNR* of *measIdleConfigSIB* of *SIB11* within *VarMeasIdleConfig*;

3> else:

- 4> remove the *measIdleCarrierListNR* in *VarMeasIdleConfig*, if stored;
- 1> for each entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig* that does not contain an *ssb-MeasConfig* received from the *RRCRelease* message:
 - 2> if there is an entry in *measIdleCarrierListNR* in *measIdleConfigSIB* of *SIB11* that has the same carrier frequency and subcarrier spacing as the entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig* and that contains *ssb-MeasConfig*:
 - 3> delete the *ssb-MeasConfig* of the corresponding entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig*;
 - 3> store the SSB measurement configuration from SIB11 into nrofSS-BlocksToAverage, absThreshSS-BlocksConsolidation, smtc, ssb-ToMeasure, deriveSSB-IndexFromCell, and ss-RSSI-Measurement within ssb-MeasConfig of the corresponding entry in the measIdleCarrierListNR within VarMeasIdleConfig;
 - 2> else if there is an entry in *interFreqCarrierFreqList* of *SIB4* with the same carrier frequency and subcarrier spacing as the entry in *measIdleCarrierListNR* within *VarMeasIdleConfig*:
 - 3> delete the *ssb-MeasConfig* of the corresponding entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig*;
 - 3> store the SSB measurement configuration from SIB4 into nrofSS-BlocksToAverage, absThreshSS-BlocksConsolidation, smtc, ssb-ToMeasure, deriveSSB-IndexFromCell, and ss-RSSI-Measurement within ssb-MeasConfig of the corresponding entry in the measIdleCarrierListNR within VarMeasIdleConfig;

2> else:

- 3> remove the *ssb-MeasConfig* of the corresponding entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig*, if stored;
- 1> perform measurements according to 5.7.8.2a.

5.7.8.2 Void

5.7.8.2a Performing measurements

When performing measurements on NR carriers according to this clause, the UE shall derive the cell quality as specified in 5.5.3.3 and consider the beam quality to be the value of the measurement results of the concerned beam, where each result is averaged as described in TS 38.215 [9].

While in RRC_IDLE or RRC_INACTIVE, and T331 is running and SDT procedure is not ongoing, the UE shall:

- 1> perform the measurements in accordance with the following:
 - 2> if the *VarMeasIdleConfig* includes the *measIdleCarrierListEUTRA* and the *SIB1* contains *idleModeMeasurementsEUTRA*:
 - 3> for each entry in *measIdleCarrierListEUTRA* within *VarMeasIdleConfig*:
 - 4> if UE supports NE-DC between the serving carrier and the carrier frequency indicated by *carrierFreqEUTRA* within the corresponding entry:
 - 5> perform measurements in the carrier frequency and bandwidth indicated by *carrierFreqEUTRA* and *allowedMeasBandwidth* within the corresponding entry;
 - 5> if the *reportQuantitiesEUTRA* is set to *rsrq*:
 - 6> consider RSRQ as the sorting quantity;
 - 5> else:
 - 6> consider RSRP as the sorting quantity;

- 5> if the *measCellListEUTRA* is included:
 - 6> consider cells identified by each entry within the *measCellListEUTRA* to be applicable for idle/inactive mode measurement reporting;
- 5> else:
 - 6> consider up to *maxCellMeasIdle* strongest identified cells, according to the sorting quantity, to be applicable for idle/inactive measurement reporting;
- 5> for all cells applicable for idle/inactive measurement reporting, derive measurement results for the measurement quantities indicated by *reportQuantitiesEUTRA*;
- 5> store the derived measurement results as indicated by *reportQuantitiesEUTRA* within the *measReportIdleEUTRA* in *VarMeasIdleReport* in decreasing order of the sorting quantity, i.e. the best cell is included first, as follows:
 - 6> if qualityThresholdEUTRA is configured:
 - 7> include the measurement results from the cells applicable for idle/inactive measurement reporting whose RSRP/RSRQ measurement results are above the value(s) provided in qualityThresholdEUTRA;
 - 6> else:
 - 7> include the measurement results from all cells applicable for idle/inactive measurement reporting;
- 2> if the VarMeasIdleConfig includes the measIdleCarrierListNR and the SIB1 contains idleModeMeasurementsNR:
 - 3> for each entry in measIdleCarrierListNR within VarMeasIdleConfig that contains ssb-MeasConfig:
 - 4> if UE supports carrier aggregation or NR-DC between serving carrier and the carrier frequency and subcarrier spacing indicated by *carrierFreq* and *ssbSubCarrierSpacing* within the corresponding entry:
 - 5> perform measurements in the carrier frequency and subcarrier spacing indicated by *carrierFreq* and *ssbSubCarrierSpacing* within the corresponding entry;
 - 5> if the *reportQuantities* is set to rsrq:
 - 6> consider RSRQ as the cell sorting quantity;
 - 5> else:
 - 6> consider RSRP as the cell sorting quantity;
 - 5> if the *measCellListNR* is included:
 - 6> consider cells identified by each entry within the *measCellListNR* to be applicable for idle/inactive measurement reporting;
 - 5> else:
 - 6> consider up to *maxCellMeasIdle* strongest identified cells, according to the sorting quantity, to be applicable for idle/inactive measurement reporting;
 - 5> for all cells applicable for idle/inactive measurement reporting, derive cell measurement results for the measurement quantities indicated by *reportQuantities*;
 - 5> store the derived cell measurement results as indicated by *reportQuantities* for cells applicable for idle/inactive measurement reporting within *measResultsPerCarrierListIdleNR* in the *measReportIdleNR* in *VarMeasIdleReport* in decreasing order of the cell sorting quantity, i.e. the best cell is included first, as follows:
 - 6> if qualityThreshold is configured:

- 7> include the measurement results from the cells applicable for idle/inactive measurement reporting whose RSRP/RSRQ measurement results are above the value(s) provided in *qualityThreshold*;
- 6> else:
 - 7> include the measurement results from all cells applicable for idle/inactive measurement reporting;
- 5> if beamMeasConfigIdle is included in the associated entry in measIdleCarrierListNR and if UE supports idleInactiveNR-MeasBeamReport for the FR of the carrier frequency indicated by carrierFreq within the associated entry, for each cell in the measurement results:
 - 6> derive beam measurements based on SS/PBCH block for each measurement quantity indicated in *reportQuantityRS-Indexes*, as described in TS 38.215 [9];
 - 6> if the *reportQuantityRS-Indexes* is set to rsrq:
 - 7> consider RSRQ as the beam sorting quantity;
 - 6> else:
 - 7> consider RSRP as the beam sorting quantity;
 - 6> set *resultsSSB-Indexes* to include up to *maxNrofRS-IndexesToReport* SS/PBCH block indexes in order of decreasing beam sorting quantity as follows:
 - 7> include the index associated to the best beam for the sorting quantity and if *absThreshSS-BlocksConsolidation* is included, the remaining beams whose sorting quantity is above *absThreshSS-BlocksConsolidation*;
 - 6> if the *includeBeamMeasurements* is set to *true*:
 - 7> include the beam measurement results as indicated by *reportQuantityRS-Indexes*;
- 2> if, as a result of the procedure in this clause, the UE performs measurements in one or more carrier frequency indicated by *measIdleCarrierListNR* or *measIdleCarrierListEUTRA*:
 - 3> store the cell measurement results for RSRP and RSRQ for the serving cell within *measResultServingCell* in the measReportIdleNR in *VarMeasIdleReport*.
 - 3> if the *VarMeasIdleConfig* includes the *measIdleCarrierListNR* and it contains an entry with *carrierFreq* set to the value of the serving frequency:
 - 4> if beamMeasConfigIdle is included in that entry, and if the UE supports idleInactiveNR-MeasBeamReport for the FR of the serving cell:
 - 5> derive beam measurements based on SS/PBCH block for each measurement quantity indicated in *reportQuantityRS-Indexes*, as described in TS 38.215 [9];
 - 5> if the reportQuantityRS-Indexes is set to rsrq:
 - 6> consider RSRQ as the beam sorting quantity;
 - 5> else:
 - 6> consider RSRP as the beam sorting quantity;
 - 5> set *resultsSSB-Indexes* to include up to *maxNrofRS-IndexesToReport* SS/PBCH block indexes in order of decreasing beam sorting quantity as follows:
 - 6> include the index associated to the best beam for the sorting quantity and if *absThreshSS-BlocksConsolidation* is included in *SIB2* of serving cell, the remaining beams whose sorting quantity is above *absThreshSS-BlocksConsolidation*;
 - 5> if the *includeBeamMeasurements* is set to true:

- 6> include the beam measurement results as indicated by reportQuantityRS-Indexes;
- NOTE 1: How the UE performs idle/inactive measurements is up to UE implementation as long as the requirements in TS 38.133 [14] are met for measurement reporting.
- NOTE 2: The UE is not required to perform idle/inactive measurements on a given carrier if the SSB configuration of that carrier provided via dedicated signaling is different from the SSB configuration broadcasted in the serving cell, if any.
- NOTE 3: How the UE prioritizes which frequencies to measure or report (in case it is configured with more frequencies than it can measure or report) is left to UE implementation.
- NOTE 4: When *idleModeMeasVoiceFallback* is included in SIB5, UE may decide to measure and report idle/inactive measurements for EUTRA carrier frequencies included in SIB5 even if it does not support NE-DC between the serving carrier and the EUTRA carrier frequencies.

5.7.8.3 T331 expiry or stop

The UE shall:

- 1> if T331 expires or is stopped:
 - 2> release the VarMeasIdleConfig.
- NOTE: It is up to UE implementation whether to continue idle/inactive measurements according to SIB11 and SIB4 configurations or according to E-UTRA SIB5 and E-UTRA SIB24 configurations as specified in TS 36.331 [10] upon inter-RAT cell reselection to E-UTRA, after T331 has expired or stopped.

5.7.8.4 Cell re-selection or cell selection while T331 is running

The UE shall:

- 1> if intra-RAT cell selection or reselection occurs while T331 is running:
 - 2> if validityAreaList is configured in VarMeasIdleConfig:
 - 3> if the serving frequency does not match with the carrierFreq of an entry in the validityAreaList; or
 - 3> if the serving frequency matches with the *carrierFreq* of an entry in the *validityAreaList*, the *validityCellList* is included in that entry, and the physical cell identity of the serving cell does not match with any entry in *validityCellList*:
 - 4> stop timer T331;
 - 4> perform the actions as specified in 5.7.8.3, upon which the procedure ends.
- 1> else if inter-RAT cell selection or reselection occurs while T331 is running:
 - 2> stop timer T331;
 - 2> perform the actions as specified in 5.7.8.3;

5.7.9 Mobility history information

5.7.9.1 General

This procedure specifies how the mobility history information is stored by the UE, covering RRC_IDLE, RRC_INACTIVE and RRC_CONNECTED.

5.7.9.2 Initiation

If the UE supports storage of mobility history information, the UE shall:

- 1> If the UE supports PSCell mobility history information and upon addition of a PSCell:
 - 2> include an entry in *visitedPSCellInfoList* in variable *VarMobilityHistoryReport* possibly after performing the following, if necessary:
 - 3> if visitedPSCellInfoListReport is available in the visitedCellInfoList in variable VarMobilityHistoryReport:
 - 4> for the oldest PCell entry in *visitedCellInfoList* including *visitedPSCellInfoListReport*;
 - 5> remove the oldest entry in the *visitedPSCellInfoListReport*;
 - 3> else:
 - 4> remove the oldest entry in visitedPSCellInfoList in variable VarMobilityHistoryReport;
 - 2> for the included entry:
 - 3> set the field *timeSpent* of the entry according to following:
 - 4> if this is the first PSCell entry for the current PCell since entering the current PCell in RRC_CONNECTED:
 - 5> include the entry as the time spent with no PSCell since entering the current PCell in RRC_CONNECTED;
 - 4> else:
 - 5> include the time spent with no PSCell since last PSCell release since entering the current PCell in RRC_CONNECTED;
- 1> If the UE supports PSCell mobility history information and upon change, or release of a PSCell while being connected to the current PCell:
 - 2> include an entry in *visitedPSCellInfoList* of the variable *VarMobilityHistoryReport* possibly after performing the following, if necessary:
 - 3> if visitedPSCellInfoListReport is available in the visitedCellInfoList in variable VarMobilityHistoryReport:
 - 4> for the oldest PCell entry in visitedCellInfoList including visitedPSCellInfoListReport;
 - 5> remove the oldest entry in the *visitedPSCellInfoListReport*;
 - 3> else:
 - 4> remove the oldest entry in visitedPSCellInfoList in variable VarMobilityHistoryReport;
 - 2> for the included entry:
 - 3> if the global cell identity of the previous PSCell is available:
 - 4> include the global cell identity of that cell in the field *visitedCellId* of the entry;
 - 3> else:
 - 4> include the physical cell identity and carrier frequency of that cell in the field *visitedCellId* of the entry;
 - 3> set the field *timeSpent* of the entry as the time spent in the previous PSCell while being connected to the current PCell;
- 1> Upon change of suitable cell, consisting of PCell in RRC_CONNECTED (for NR or E-UTRA cell) or serving cell in RRC_INACTIVE (for NR cell) or in RRC_IDLE (for NR or E-UTRA cell), to another NR or E-UTRA cell, or when entering any cell selection' state from 'camped normally' state in NR or LTE or when entering 'any cell selection' state from a suitable cell in RRC_CONNECTED state in NR or LTE:

- 2> include an entry in *visitedCellInfoList* of the variable *VarMobilityHistoryReport* possibly after removing the oldest entry, if necessary, according to following:
 - 3> if the global cell identity of the previous PCell/serving cell is available:
 - 4> include the global cell identity of that cell in the field *visitedCellId* of the entry;
 - 3> else:
 - 4> include the physical cell identity and carrier frequency of that cell in the field *visitedCellId* of the entry;
 - 3> set the field *timeSpent* of the entry as the time spent in the previous PCell/serving cell;
 - 3> if the UE supports PSCell mobility history information and if the UE continues to be connected to the same PSCell during the change of the PCell in RRC_CONNECTED; or
 - 3> if the UE supports PSCell mobility history information and if the UE changes PSCell, or attempts to change PSCell but fails, at the same time as the change of the PCell in RRC_CONNECTED:
 - 4> include an entry in *visitedPSCellInfoList* of the variable *VarMobilityHistoryReport* possibly after performing the following, if necessary:
 - 5> if *visitedPSCellInfoListReport* is available in the *visitedCellInfoList* in variable *VarMobilityHistoryReport*:
 - 6> for the oldest PCell entry in visitedCellInfoList including visitedPSCellInfoListReport;
 - 7> remove the oldest entry in the *visitedPSCellInfoListReport*;
 - 5> else:
 - 6> remove the oldest entry in visitedPSCellInfoList in variable VarMobilityHistoryReport;
 - 4> for the included entry:
 - 5> if the global cell identity of the PSCell (in case the UE continues to be connected to the same PSCell) or the previous PSCell (in case the UE changes PSCell, or attempts to change PSCell but fails) is available:
 - 6> include the global cell identity of that cell in the field *visitedCellId* of the entry;
 - 5> else:
 - 6> include the physical cell identity and carrier frequency of that cell in the field *visitedCellId* of the entry;
 - 5> set the field *timeSpent* of the entry as the time spent in the PSCell, while being connected to previous PCell;
 - 3> if the UE supports PSCell mobility history information and if the UE was not configured with a PSCell at the time of change of PCell in RRC_CONNECTED:
 - 4> include an entry in visitedPSCellInfoList after performing the following, if necessary;
 - 5> if *visitedPSCellInfoListReport* is available in the *visitedCellInfoList* in variable *VarMobilityHistoryReport*:
 - 6> for the oldest PCell entry in visitedCellInfoList including visitedPSCellInfoListReport;
 - 7> remove the oldest entry in the *visitedPSCellInfoListReport*;
 - 5> else:
 - 6> remove the oldest entry in visitedPSCellInfoList in variable VarMobilityHistoryReport;
 - 4> for the included entry:

- 5> set the field *timeSpent* of the entry as the time without PSCell according to the following:
 - 6> if the UE experienced a PSCell release since entering the previous PCell in RRC_CONNECTED:
 - 7> include the time spent with no PSCell since last PSCell release since entering the previous PCell in RRC_CONNECTED;
 - 6> else:
 - 7> include the time spent with no PSCell since entering the previous PCell in RRC_CONNECTED;
- 3> if the UE supports PSCell mobility history information and if *visitedPSCellInfoList* exists in *VarMobilityHistoryReport*:
 - 4> include *visitedPSCellInfoList* in *VarMobilityHistoryReport* in the *visitedPSCellInfoListReport* within the entry of the *visitedCellInfoList* associated to the latest PCell entry;
 - 4> remove *visitedPSCellInfoList* from the variable *VarMobilityHistoryReport*;
- 1> if the UE supports PSCell mobility history information and upon entering 'camped normally' state in NR (in RRC_IDLE or RRC_INACTIVE) or E-UTRA (in RRC_IDLE) while previously in RRC_CONNECTED state NR or LTE while not connected to a PSCell:
 - 2> include an entry in *visitedPSCellInfoList* after performing the following, if necessary;
 - 3> if *visitedPSCellInfoListReport* is available in the *visitedCellInfoList* in variable *VarMobilityHistoryReport*:
 - 4> for the oldest PCell entry in visitedCellInfoList including visitedPSCellInfoListReport;
 - 5> remove the oldest entry in the *visitedPSCellInfoListReport*;
 - 3> else:
 - 4> remove the oldest entry in *visitedPSCellInfoList* in variable *VarMobilityHistoryReport*;
 - 2> for the included entry:
 - 3> set the field *timeSpent* of the entry as the time without PSCell according to the following:
 - 4> if the UE experienced a PSCell release since entering the current PCell in RRC_CONNECTED:
 - 5> include the time spent with no PSCell since last PSCell release after entering the current PCell in RRC_CONNECTED;
 - 4> else:
 - 5> include the time spent with no PSCell since entering the current PCell in RRC_CONNECTED;
- 1> upon entering 'camped normally' state in NR (in RRC_IDLE or RRC_INACTIVE) or E-UTRA (in RRC_IDLE) while previously in 'any cell selection' state or 'camped on any cell' state in NR or LTE:
 - 2> include an entry in variable *VarMobilityHistoryReport* possibly after removing the oldest entry, if necessary, according to following:
 - 3> set the field *timeSpent* of the entry as the time spent in 'any cell selection' state and/or 'camped on any cell' state in NR or LTE.

5.7.10 UE Information

5.7.10.1 General

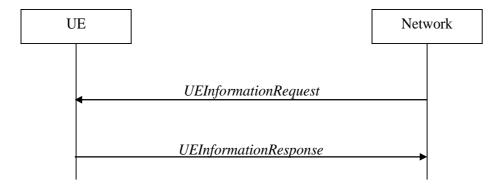


Figure 5.7.10.1-1: UE information procedure

The UE information procedure is used by the network to request the UE to report information.

5.7.10.2 Initiation

The network initiates the procedure by sending the *UEInformationRequest* message. The network should initiate this procedure only after successful security activation.

5.7.10.3 Reception of the *UEInformationReguest* message

Upon receiving the UEInformationRequest message, the UE shall, only after successful security activation:

- 1> if the *idleModeMeasurementReq* is included in the *UEInformationRequest* and the UE has stored *VarMeasIdleReport* that contains measurement information concerning cells other than the PCell:
 - 2> set the *measResultIdleEUTRA* in the *UEInformationResponse* message to the value of *measReportIdleEUTRA* in the *VarMeasIdleReport*, *if available*;
 - 2> set the *measResultIdleNR* in the *UEInformationResponse* message to the value of *measReportIdleNR* in the *VarMeasIdleReport*, if available;
 - 2> discard the *VarMeasIdleReport* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;
- 1> if the *logMeasReportReq* is present and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 2> if *VarLogMeasReport* includes one or more logged measurement entries, set the contents of the *logMeasReport* in the *UEInformationResponse* message as follows:
 - 3> include the absoluteTimeStamp and set it to the value of absoluteTimeInfo in the VarLogMeasReport;
 - 3> include the traceReference and set it to the value of traceReference in the VarLogMeasReport;
 - 3> include the *traceRecordingSessionRef* and set it to the value of *traceRecordingSessionRef* in the *VarLogMeasReport*;
 - 3> include the *tce-Id* and set it to the value of *tce-Id* in the *VarLogMeasReport*;
 - 3> include the *logMeasInfoList* and set it to include one or more entries from the *VarLogMeasReport* starting from the entries logged first, and for each entry of the *logMeasInfoList* that is included, include all information stored in the corresponding *logMeasInfoList* entry in *VarLogMeasReport*;
 - 3> if the *VarLogMeasReport* includes one or more additional logged measurement entries that are not included in the *logMeasInfoList* within the *UEInformationResponse* message:

- 4> include the *logMeasAvailable*;
- 4> if *bt-LocationInfo* is included in *locationInfo* of one or more of the additional logged measurement entries in *VarLogMeasReport* that are not included in the *logMeasInfoList* within the *UEInformationResponse* message:
 - 5> include the *logMeasAvailableBT*;
- 4> if wlan-LocationInfo is included in locationInfo of one or more of the additional logged measurement entries in VarLogMeasReport that are not included in the logMeasInfoList within the UEInformationResponse message:
 - 5> include the *logMeasAvailableWLAN*;
- 1> if *ra-ReportReq* is set to *true* and the UE has random access related information available in *VarRA-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRA-Report*:
 - 2> set the ra-ReportList in the UEInformationResponse message to the value of ra-ReportList in VarRA-Report;
 - 2> discard the *ra-ReportList* from *VarRA-Report* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;
- 1> if *rlf-ReportReq* is set to *true*:
 - 2> if the UE has radio link failure information or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*:
 - 3> set *timeSinceFailure* in *VarRLF-Report* to the time that elapsed since the last radio link failure or handover failure in NR;
 - 3> set the rlf-Report in the UEInformationResponse message to the value of rlf-Report in VarRLF-Report;
 - 3> discard the *rlf-Report* from *VarRLF-Report* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;
 - 2> else if the UE is capable of cross-RAT RLF reporting as defined in TS 38.306 [26] and has radio link failure information or handover failure information available in *VarRLF-Report* of TS 36.331 [10] and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report* of TS 36.331 [10]:
 - 3> set *timeSinceFailure* in *VarRLF-Report* of TS 36.331 [10] to the time that elapsed since the last radio link failure or handover failure in EUTRA;
 - 3> set failedPCellId-EUTRA in the *rlf-Report* in the *UEInformationResponse* message to indicate the PCell in which RLF was detected or the source PCell of the failed handover in the *VarRLF-Report* of TS 36.331 [10];
 - 3> set the *measResult-RLF-Report-EUTRA* in the *rlf-Report* in the *UEInformationResponse* message to the value of *rlf-Report* in *VarRLF-Report* of TS 36.331 [10];
 - 3> discard the *rlf-Report* from *VarRLF-Report* of TS 36.331 [10] upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;
- 1> if connEstFailReportReq is set to true and the UE has connection establishment failure or connection resume failure information in VarConnEstFailReport or VarConnEstFailReportList and if the RPLMN is equal to plmn-Identity stored in VarConnEstFailReport or in at least one of the entries of VarConnEstFailReportList:
 - 2> set *timeSinceFailure* in *VarConnEstFailReport* to the time that elapsed since the last connection establishment failure or connection resume failure in NR;
 - 2> set the *connEstFailReport* in the *UEInformationResponse* message to the value of *connEstFailReport* in *VarConnEstFailReport*;
 - 2> if the UE supports multiple CEF report:
 - 3> for each connEstFailReport in the connEstFailReportList in VarConnEstFailReportList:

- 4> set *timeSinceFailure* to the time that elapsed since the associated connection establishment failure or connection resume failure in NR:
- 2> for each connEstFailReport in the connEstFailReportList in the UEInformationResponse message, set the value to the value of connEstFailReport in VarConnEstFailReport in VarConnEstFailReportList;
- 2> discard the *connEstFailReport* from *VarConnEstFailReport* and *VarConnEstFailReportList* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;
- 1> if the *mobilityHistoryReportReq* is set to *true*:
 - 2> include the *mobilityHistoryReport* and set it to include *visitedCellInfoList* from *VarMobilityHistoryReport*;
 - 2> include in the *mobilityHistoryReport* an entry for the current PCell, possibly after removing the oldest entry if required, and set its fields as follows:
 - 3> set *visitedCellId* to the global cell identity or the physical cell identity and carrier frequency of the current PCell:
 - 3> set field timeSpent to the time spent in the current PCell;
 - 3> if the UE supports PSCell mobility history information and if *visitedPSCellInfoList* is present in *VarMobilityHistoryReport*:
 - 4> for the newest entry of the PCell in the *mobilityHistoryReport*, include *visitedPSCellInfoList* from *VarMobilityHistoryReport*;
 - 4> if the UE is configured with a PSCell:
 - 5> for the newest entry of the PCell in the *mobilityHistoryReport*, include the current PSCell information in the *visitedPSCellInfoListReport*, possibly after removing the oldest PSCell entry of a PCell in the *mobilityHistoryReport*, if required, and set its fields as follows:
 - 6> set *visitedCellId* to the global cell identity or the physical cell identity and carrier frequency of the current PSCell:
 - 6> set field *timeSpent* to the time spent in the current PSCell while being connected to the current PCell;

4> else:

- 5> for the newest entry of the PCell in the *mobilityHistoryReport*, include a new entry in the *visitedPSCellInfoListReport*, possibly after removing the oldest PSCell entry of a PCell in the *mobilityHistoryReport*, if required, and set its fields as follows:
 - 6> set field *timeSpent* to the time spent without PSCell in the current PCell since last PSCell release since connected to the current PCell in RRC_CONNECTED;
- 3> else if the UE supports PSCell mobility history information:
 - 4> if the UE is configured with a PSCell:
 - 5> for the newest entry of the PCell in the *mobilityHistoryReport*, include the current PSCell information in the *visitedPSCellInfoListReport*, possibly after removing the oldest PSCell entry of a PCell in the *mobilityHistoryReport*, if required, and set its fields as follows:
 - 6> set *visitedCellId* to the global cell identity or the physical cell identity and carrier frequency of the current PSCell:
 - 6> set field *timeSpent* to the time spent in the current PSCell while being connected to the current PCell:

4> else:

5> for the newest entry of the PCell in the *mobilityHistoryReport*, include a new entry in the *visitedPSCellInfoListReport*, possibly after removing the oldest PSCell entry of a PCell in the *mobilityHistoryReport*, if required, and set its fields as follows:

- 6> set field *timeSpent* to the time spent without PSCell in the current PCell since connected to the current PCell in RRC_CONNECTED;
- 1> if the *successHO-ReportReq* is set to *true* and if the UE has successful handover related information available in *VarSuccessHO-Report* and if the RPLMN is included in the *plmn-IdentityList* stored in *VarSuccessHO-Report*:
 - 2> if the *successHO-Report* in the *VarSuccessHO-Report* concerns a DAPS handover and if a PDCP PDU has been received from the source cell of the concerned HO and a non-duplicated PDCP PDU has been received from the target cell of the concerned HO:
 - 3> set *upInterruptionTimeAtHO* in *VarSuccessHO-Report* to include the time elapsed between the time of arrival of the last PDCP PDU received from the source cell of the concerned handover and the time of arrival of the first non-duplicate PDCP PDU received from the target cell of the concerned handover, as measured at the time of arrival of the first non-duplicate PDCP PDU received from the target cell;
 - 2> set the *successHO-Report* in the *UEInformationResponse* message to the value of *successHO-Report* in the *VarSuccessHO-Report*, if available;
 - 2> discard the *VarSuccessHO-Report* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;
- 1> if the *coarseLocationRequest* is set to *true*:
 - 2> include coarseLocationInfo, if available;
- 1> if the *logMeasReport* is included in the *UEInformationResponse*:
 - 2> submit the UEInformationResponse message to lower layers for transmission via SRB2;
 - 2> discard the logged measurement entries included in the *logMeasInfoList* from *VarLogMeasReport* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;
- 1> else:
 - 2> submit the *UEInformationResponse* message to lower layers for transmission via SRB1.

5.7.10.4 Actions upon successful completion of a random-access procedure or on completion of a request of on-demand system information

Upon successfully performing random-access procedure initialized with 4-step or 2-step RA type, or upon failed or successfully completed on-demand system information acquisition procedure in RRC_IDLE or RRC_INACTIVE state, the UE shall:

- 1> if the RPLMN or the PLMN selected by upper layers (see TS24.501 [23]) from the PLMN(s) included in the *plmn-IdentityList* in *SIB1* is not included in *plmn-IdentityList* stored in a non-empty *VarRA-Report*:
 - 2> clear the information included in *VarRA-Report*;
- 1> if the number of RA-Report entries stored in the ra-ReportList in VarRA-Report is less than maxRAReport:
 - 2> if the number of PLMN entries in plmn-IdentityList stored in VarRA-Report is less than maxPLMN; or
 - 2> if the number of PLMN entries in *plmn-IdentityList* stored in *VarRA-Report* is equal to *maxPLMN* and the list of EPLMNs is subset of or equal to the *plmn-IdentityList* stored in *VarRA-Report*:
 - 3> append the following contents associated to the successfully completed random-access procedure or the failed or successfully completed on-demand system information acquisition procedure as a new entry in the *VarRA-Report*:
 - 4> if the list of EPLMNs has been stored by the UE:
 - 5> set the *plmn-IdentityList* to include the list of EPLMNs stored by the UE (i.e. includes the RPLMN) without exceeding the limit of *maxPLMN*;
 - 4> else:

- 5> set the *plmn-Identity*, in *plmn-IdentityList*, to the PLMN selected by upper layers (see TS 24.501 [23]) from the PLMN(s) included in the *plmn-IdentityInfoList* in SIB1;
- 4> set the *cellId* to the global cell identity and the tracking area code, if available, otherwise to the physical cell identity and carrier frequency of the cell in which the corresponding random-access preamble was transmitted;
- 4> if the corresponding random-access procedure was performed on an SCell of MCG:
 - 5> set the *spCellId* to the global cell identity of the PCell;
- 4> if the corresponding random-access procedure was performed on an SCell of SCG; or
- 4> if the corresponding random-access procedure was performed on PSCell:
 - 5> set the *spCellId* to the global cell identity of the PSCell, if available, otherwise, set the *spCellId* to the global cell identity of the PCell;
- 4> set the raPurpose to include the purpose of triggering the random-access procedure;
- 4> set the ra-InformationCommon as specified in clause 5.7.10.5.

The UE may discard the random access report information, i.e. release the UE variable *VarRA-Report*, 48 hours after the last successful random access procedure or the failed or successfully completed on-demand system information acquisition procedure related information is added to the *VarRA-Report*.

NOTE 1: The UE does not log the RA information in the RA report if the triggering event of the random access is consistent UL LBT on SpCell as specified in TS 38.321 [6].

5.7.10.5 RA information determination

The UE shall set the content in *ra-InformationCommon* as follows:

- 1> set the *absoluteFrequencyPointA* to indicate the absolute frequency of the reference resource block associated to the random-access resources used in the random-access procedure;
- 1> set the *locationAndBandwidth* and *subcarrierSpacing* associated to the UL BWP of the random-access resources used in the random-access procedure;
- 1> if contention based random-access resources are used in the random-access procedure:
 - 2> set the *msgA_RO-FrequencyStart* and *msgA-RO-FDM* and *msgA-SubcarrierSpacing* associated to the 2 step random- access resources if used in the random-access procedure;
 - 2> if *msgA-SubcarrierSpacing* associated to the 2 step random-access resources used in the random-access procedure is available:
 - 3> set the *msgA-SubcarrierSpacing* associated to the 2 step random-access resources used in the random-access procedure;
 - 2> else if only 2 step random-access resources are available in the UL BWP used in the random-access procedure:
 - 3> set the *msgA-SCS-From-prach-ConfigurationIndex* to the subcarrier spacing as derived from the *msgA-PRACH-ConfigurationIndex* used in the 2-step random-access procedure;

2> else:

- 3> set the *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure;
- 2> set the *msg1-FrequencyStart* associated to the 4 step random-access resources if used in the random-access procedure, and if its value is different from the value of *msgA-RO-FrequencyStart* if it is included in the *ra-InformationCommon*;

- 2> set the *msg1-FDM* associated to the 4 step random-access resources if used in the random-access procedure, and if its value is different from the value of *msgA-RO-FDMCFRA* if it is included in the *ra-InformationCommon*;
- 2> if *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure is available, and if its value is different from the value of *msgA-SubcarrierSpacing* if it is included in the *ra-InformationCommon*:
 - 3> set the *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure;

2 > else:

- 3> set the *msg1-SCS-From-prach-ConfigurationIndex* to the subcarrier spacing as derived from the *prach-ConfigurationIndex* used in the 4-step random-access procedure, and if its value is different from the value of *msgA-SCS-From-prach-ConfigurationIndex* if it is included in the *ra-InformationCommon*;
- 1> if contention free random-access resources are used in the random-access procedure:
 - 2> set the *msg1-FrequencyStartCFRA* and *msg1-FDMCFRA* associated to the 4 step random-access resources if used in the random-access procedure;
 - 2> if *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure is available:
 - 3> set the *msg1-SubcarrierSpacingCFRA* associated to the 4 step random-access resources used in the random-access procedure;

2> else:

- 3> set the *msg1-SCS-From-prach-ConfigurationIndexCFRA* to the subcarrier spacing as derived from the *prach-ConfigurationIndex* used in the 4 step random-access procedure;
- 2> set the *msgA-RO-FrequencyStartCFRA* and *msgA-RO-FDMCFRA* associated to the 2 step contention free random access resources if used in the random-access procedure;
- 2> set the *msgA-MCS*, the *nrofPRBs-PerMsgA-PO*, the *msgA-PUSCH-TimeDomainAllocation*, the *frequencyStartMsgA-PUSCH*, the *nrofMsgA-PO-FDM* associated to the 2 step random-access resources if used in the random-access procedure;
- 2> if *msgA-SubcarrierSpacing* associated to the 2 step random-access resources used in the random-access procedure is available:
 - 3> set the *msgA-SubcarrierSpacing* associated to the 2 step random-access resources used in the random-access procedure;
- 2> else if only 2 step random-access resources are available in the UL BWP used in the random-access procedure:
 - 3> set the *msgA-SCS-From-prach-ConfigurationIndex* to the subcarrier spacing as derived from the *msgA-PRACH-ConfigurationIndex* used in the 2-step random-access procedure;

2> else:

- 3> set the *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure;
- 1> if the random access procedure is initialized with RA_TYPE set to 2-stepRA as described in TS 38.321 [3]:
 - 2> set the *dlPathlossRSRP* to the measured RSRP of the DL pathloss reference obtained at the time of *RA_Type* selection stage of the initialization of the RA procedure as captured in TS 38.321 [3];
 - 2> if the configuration for the random access *msgA-TransMax* was configured in *RACH-ConfigDedicated* for this random access procedure, and *ra-Purpose* is set to *reconfigurationWithSync*:
 - 3> set msgA-TransMax to the value of msgA-TransMax in RACH-ConfigDedicated;

- 2> else if *msgA-TransMax* was configured in *RACH-ConfigCommonTwoStepRA*:
 - 3> set msgA-TransMax to the value of msgA-TransMax in RACH-ConfigCommonTwoStepRA;
- 2> set the *msgA-PUSCH-PayloadSize* to the size of the overall payload available in the UE buffer at the time of initiating the 2 step RA procedure;
- 1> if the purpose of the random access procedure is to request on-demand system information (i.e., if the *raPurpose* is set to *requestForOtherSI* or *msg3RequestForOtherSI*):
 - 2> set the *intendedSIBs* to indicate the SIB(s) the UE wanted to receive as a result of the SI request;
 - 2> set the ssbsForSI-Acquisition to indicate the SSB(s) used to receive the SI message;
 - 2> if the on-demand system information acquisition was successful:
 - 3> set the *onDemandSISuccess* to *true*;
- 1> set the parameters associated to individual random-access attempt in the chronological order of attempts in the *perRAInfoList* as follows:
 - 2> if the random-access resource used is associated to a SS/PBCH block, set the associated random-access parameters for the successive random-access attempts associated to the same SS/PBCH block for one or more random-access attempts as follows:
 - 3> set the ssb-Index to include the SS/PBCH block index associated to the used random-access resource;
 - 3> set the *numberOfPreamblesSentOnSSB* to indicate the number of successive random-access attempts associated to the SS/PBCH block;
 - 3> for each random-access attempt performed on the random-access resource, include the following parameters in the chronological order of the random-access attempt:
 - 4> if the random-access attempt is performed on the contention based random-access resource and if *raPurpose* is not equal to '*requestForOtherSI*', include *contentionDetected* as follows:
 - 5> if contention resolution was not successful as specified in TS 38.321 [6] for the transmitted preamble:
 - 6> set the *contentionDetected* to *true*;
 - 5> else:
 - 6> set the *contentionDetected* to *false*;
 - 4> if the random access attempt is a 2-step random access attempt:
 - 5> if fallback from 2-step random access to 4-step random access occurred during the random access attempt:
 - 6> set fallbackToFourStepRA to true;
 - 4> if the random-access attempt is performed on the contention based random-access resource; or
 - 4> if the random-access attempt is performed on the contention free random-access resource and if the random-access procedure was initiated due to the PDCCH ordering:
 - 5> if the random access attempt is a 4-step random access attempt and the SS/PBCH block RSRP of the SS/PBCH block corresponding to the random-access resource used in the random-access attempt is above *rsrp-ThresholdSSB*; or
 - 5> if the random access attempt is a 2-step random access attempt and the SS/PBCH block RSRP of the SS/PBCH block corresponding to the random-access resource used in the random-access attempt is above *msgA-RSRP-ThresholdSSB*:
 - 6> set the dlRSRPAboveThreshold to true;

5> else:

- 6> set the *dlRSRPAboveThreshold* to *false*;
- 2> else if the random-access resource used is associated to a CSI-RS, set the associated random-access parameters for the successive random-access attempts associated to the same CSI-RS for one or more random-access attempts as follows:
 - 3> set the csi-RS-Index to include the CSI-RS index associated to the used random-access resource;
 - 3> set the *numberOfPreamblesSentOnCSI-RS* to indicate the number of successive random-access attempts associated to the CSI-RS.

NOTE 1: Void.

5.7.10.6 Actions for the successful handover report determination

The UE shall for the PCell:

- 1> if the ratio between the value of the elapsed time of the timer T304 and the configured value of the timer T304, included in the last applied *RRCReconfiguration* message including the *reconfigurationWithSync*, is greater than *thresholdPercentageT304* if included in the *successHO-Config* received before executing the last reconfiguration with sync; or
- 1> if the ratio between the value of the elapsed time of the timer T310 and the configured value of the timer T310, configured while the UE was connected to the source PCell before executing the last reconfiguration with sync, is greater than *thresholdPercentageT310* included in the *successHO-Config* if configured by the source PCell before executing the last reconfiguration with sync; or
- 1> if the T312 associated to the measurement identity of the target cell was running at the time of initiating the execution of the reconfiguration with sync procedure and if the ratio between the value of the elapsed time of the timer T312 and the configured value of the timer T312, configured while the UE was connected to the source PCell before executing the last reconfiguration with sync, is greater than *thresholdPercentageT312* included in the *successHO-Config* if configured by the source PCell before executing the last reconfiguration with sync; or
- 1> if *sourceDAPS-FailureReporting* is included in the *successHO-Config* before executing the last reconfiguration with sync and is set to *true* and if the last executed handover was a DAPS handover and if an RLF occurred at the source PCell during the DAPS handover while T304 was running:
 - 2> store the successful handover information in *VarSuccessHO-Report* and determine the content in *VarSuccessHO-Report* as follows:
 - 3> clear the information included in *VarSuccessHO-Report*, if any;
 - 3> set the plmn-IdentityList to include the list of EPLMNs stored by the UE (i.e., includes the RPLMN);
 - 3> set the *c-RNTI* to the C-RNTI assigned by the target PCell of the handover;
 - 3> for the source PCell in which the last *RRCReconfiguration* message including *reconfigurationWithSync* was applied:
 - 4> set the *sourceCellID* in *sourceCellInfo* to the global cell identity and tracking area code, if available, of the source PCell;
 - 4> set the *sourceCellMeas* in *sourceCellInfo* to include the cell level RSRP, RSRQ and the available SINR, of the source PCell based on the available SSB and CSI-RS measurements collected up to the moment the UE sends *RRCReconfigurationComplete* message;
 - 4> set the *rsIndexResults* in *sourceCellMeas* to include all the available SSB and CSI-RS measurement quantities of the source PCell collected up to the moment the UE sends *RRCReconfigurationComplete* message;
 - 4> if the last executed handover was a DAPS handover and if an RLF occurred at the source PCell during the DAPS handover while T304 was running:

- 5> set the *rlf-InSourceDAPS* in *sourceCellInfo* to *true*;
- 3> for the target PCell indicated in the last applied *RRCReconfiguration* message including *reconfigurationWithSync*:
 - 4> set the *targetCellID* in *targetCellInfo* to the global cell identity and tracking area code, if available, of the target PCell;
 - 4> set the *targetCellMeas* in *targetCellInfo* to include the cell level RSRP, RSRQ and the available SINR, of the target PCell based on the available SSB and CSI-RS measurements collected up to the moment the UE sends *RRCReconfigurationComplete* message;
 - 4> set the *rsIndexResults* in *targetCellMeas* to include all the available SSB and CSI-RS measurement quantities of the target PCell collected up to the moment the UE sends *RRCReconfigurationComplete* message;
 - 4> if the last applied *RRCReconfiguration* message including *reconfigurationWithSync* was included in the stored *condRRCReconfig*:
 - 5> set the *timeSinceCHO-Reconfig* to the time elapsed between the initiation of the execution of conditional reconfiguration for the target PCell and the reception of the last *conditionalReconfiguration* including the *condRRCReconfig* of the target PCell in the source PCell;
- 3> if the ratio between the value of the elapsed time of the timer T304 and the configured value of the T304 timer, included in the last applied *RRCReconfiguration* message including the *reconfigurationWithSync*, is greater than *thresholdPercentageT304* if included in the *successHO-Config* received before executing the last reconfiguration with sync:
 - 4> set t304-cause in shr-Cause to true:
 - 4> set the *ra-InformationCommon* to include the random-access related information associated to the random access procedure in the target PCell, as specified in clause 5.7.10.5;
- 3> if the ratio between the value of the elapsed time of the timer T310 and the configured value of the T310 timer, configured while the UE was connected to the source PCell before executing the last reconfiguration with sync, is greater than *thresholdPercentageT310* included in the *successHO-Config* if configured by the source PCell before executing the last reconfiguration with sync:
 - 4> set t310-cause in shr-Cause to true;
- 3> if the T312 associated to the measurement identity of the target cell was running at the time of initiating the execution of the reconfiguration with sync procedure and if the ratio between the value of the elapsed time of the timer T312 and the configured value of the T312 timer, configured while the UE was connected to the source PCell before executing the last reconfiguration with sync, is greater than *thresholdPercentageT312* included in the *successHO-Config* if configured by the source PCell before executing the last reconfiguration with sync:
 - 4> set t312-cause in shr-Cause to true;
- 3> if *sourceDAPS-FailureReporting* included in the *successHO-Config* if configured by the source PCell before executing the last reconfiguration with sync is set to *true*, and if the last executed handover was a DAPS handover and if an RLF occurred at the source PCell during the DAPS handover while T304 was running:
 - 4> set sourceDAPS-Failure in shr-Cause to true;
- 3> for each of the *measObjectNR*, configured by the source PCell, in which the last *RRCReconfiguration* message including *reconfigurationWithSync* was applied:
 - 4> if measurements are available for the measObjectNR:
 - 5> if the SS/PBCH block-based measurement quantities are available:
 - 6> set the *measResultListNR* in *measResultNeighCells* to include all the available measurement quantities of the best measured cells, other than the source PCell or target PCell, ordered such

that the cell with highest SS/PBCH block RSRP is listed first if SS/PBCH block RSRP measurement results are available, otherwise the cell with highest SS/PBCH block RSRQ is listed first if SS/PBCH block RSRQ measurement results are available, otherwise the cell with highest SS/PBCH block SINR is listed first, based on the available SS/PBCH block based measurements collected up to the moment the UE sends the *RRCReconfigurationComplete* message;

- 6> for each neighbour cell included, include the optional fields that are available;
- NOTE 1: For the neighboring cells set included in *measResultListNR* in *measResultNeighCells* ordered based on the SS/PBCH block measurement quantities, the UE includes also the CSI-RS based measurement quantities, if available.
 - 5> if the CSI-RS measurement quantities are available:
 - 6> set the *measResultListNR* in *measResultNeighCells* to include all the available measurement quantities of the best measured cells, other than the source PCell and target PCell, ordered such that the cell with highest CSI-RS RSRP is listed first if CSI-RS RSRP measurement results are available, otherwise the cell with highest CSI-RS RSRQ is listed first if CSI-RS RSRQ measurement results are available, otherwise the cell with highest CSI-RS SINR is listed first, based on the available CSI-RS based measurements collected up to the moment the UE sends the *RRCReconfigurationComplete* message;
 - 6> for each neighbour cell included, include the optional fields that are available;
- NOTE 2: For the neighboring cells set ordered based on the CSI-RS measurement quantities, the UE includes measurements only for the cells not yet included in *measResultListNR* in *measResultNeighCells* to avoid overriding SS/PBCH block-based ordered measurements.
 - 3> for each of the *measObjectEUTRA*, configured by the source PCell in which the last *RRCReconfiguration* message including *reconfigurationWithSync* was applied:
 - 4> if measurements are available for the *measObjectEUTRA*:
 - 5> set the *measResultListEUTRA* in *measResultNeighCells* to include the best measured cells ordered such that the cell with highest RSRP is listed first if RSRP measurement results are available, otherwise the cell with highest RSRQ is listed first, based on measurements collected up to the moment the UE sends the *RRCReconfigurationComplete* message;
 - 5> for each neighbour cell included, include the optional fields that are available;
 - 3> for each of the neighbour cells included in *measResultNeighCells*:
 - 4> if the cell was a candidate target cell included in the *condRRCReconfig* within the *conditionalReconfiguration* configured by the source PCell, in which the last *RRCReconfiguration* message including *reconfigurationWithSync* was applied:
 - 5> set the choCandidate to true in measResultNR;
 - 3> if available, set the *locationInfo* as in 5.3.3.7;
- 1> release *successHO-Config* configured by the source PCell and *thresholdPercentageT304* if configured by the target PCell.

The UE may discard the successful handover information, i.e., release the UE variable *VarSuccessHO-Report*, 48 hours after the last successful handover information is added to the *VarSuccessHO-Report*.

5.7.12 IAB Other Information

5.7.12.1 General

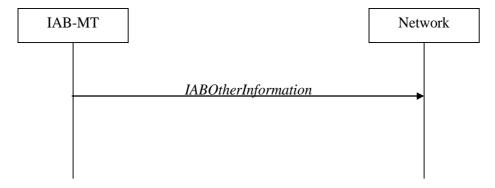


Figure 5.7.12.1-1: IAB Other Information procedure

The IAB Other Information procedure is used by IAB-MT to request the IAB-donor-CU to allocate IP address or inform the IAB-donor-CU of the IP address for the collocated IAB-DU.

5.7.12.2 Initiation

Upon initiation of the procedure, the IAB-MT shall:

1> initiate transmission of the IABOtherInformation message in accordance with 5.7.12.3;

5.7.12.3 Actions related to transmission of *IABOtherInformation* message

The IAB-MT shall set the contents of IABOtherInformation message as follows:

- 1> if the procedure is used to request IP addresses:
 - 2> if IPv4 addresses are requested:
 - 3> set the *iab-IPv4-AddressNumReq* to the number of IPv4 addresses requested per specific usage;
 - 2> if IPv6 addresses or IPv6 address prefixes are requested:
 - 3> if IPv6 addresses are requested:
 - 4> set the *iab-IPv6-AddressNumReq* to the number of IPv6 addresses requested per specific usage;
 - 3> else if IPv6 address prefixes are requested:
 - 4> set the *iab-IPv6-AddressPrefixReq* to *true* per specific usage;
- 1> if the procedure is used to report IP addresses:
 - 2> if IPv4 addresses are reported:
 - 3> include iPv4-Address in iab-IPv4-AddressReport, and for each IP address included:
 - 4> if IPv4 addresses are used for F1-C traffic:
 - 5> include these addresses in *f1-C-Traffic-IP-Address*.
 - 4> if IPv4 addresses are used for F1-U traffic:
 - 5> include these addresses in *f1-U-Traffic-IP-Address*.
 - 4> if IPv4 address are used for non-F1 traffic:
 - 5> include these addresses in *non-f1-Traffic-IP-Address*.

- 4> if IPv4 addresses are used for all traffic:
 - 5> include these addresses in all-Traffic-IAB-IP-Address.
- 2> if IPv6 addresses or IPv6 address prefixes are reported:
 - 3> if IPv6 addresses are reported:
 - 4> include iPv6-Address in iab-IPv6-AddressReport, and for each IP address included;
 - 5> if IPv6 addresses are used for F1-C traffic:
 - 6> include these addresses in f1-C-Traffic-IP-Address.
 - 5> if IPv6 addresses are used for F1-U traffic:
 - 6> include these addresses in *f1-U-Traffic-IP-Address*.
 - 5> if IPv6 addresses are used for non-F1 traffic:
 - 6> include these addresses in non-f1-Traffic-IP-Address.
 - 5> if IPv6 addresses are used for all traffic:
 - 6> include these addresses in all-Traffic-IAB-IP-Address.
 - 3> else if IPv6 address prefixes are reported:
 - 4> include these iPv6-Prefix in iab-IPv6-PrefixReport, and for each IP address prefix included;
 - 5> if this IPv6 address prefix is used for F1-C traffic:
 - 6> include this prefix in *f1-C-Traffic-IP-Address*.
 - 5> if this IPv6 address prefix is used for F1-U traffic:
 - 6> include this prefix in f1-U-Traffic-IP-Address.
 - 5> if this IPv6 address prefix is used for non-F1 traffic:
 - 6> include this prefix in non-f1-Traffic-IP-Address.
 - 5> if this IPv6 address prefix is used for all traffic:
 - 6> include this prefix in all-Traffic-IAB-IP-Address.
- 1> if the IAB-MT is in (NG)EN-DC, or
- 1> if the IAB-MT is in NR-DC and the IAB Other Information procedure is towards the IAB-donor-CU in the SN:
 - 2> if SRB3 is configured:
 - 3> submit the IABOtherInformation message via SRB3 to lower layers for transmission;
 - 2> else if the IAB-MT is in (NG)EN-DC:
 - 3> submit the *IABOtherInformation* message via the E-UTRA MCG embedded in E-UTRA RRC message *ULInformationTransferMRDC* as specified in TS 36.331 [10];
 - 2> else:
 - 3> submit the *IABOtherInformation* message via the NR MCG embedded in NR RRC message *ULInformationTransferMRDC* as specified in clause 5.7.2a.3;
- 1> else:
 - 2> submit the IABOtherInformation message to lower layers for transmission.

5.7.13 RLM/BFD relaxation

In case both low mobility criterion and good serving cell criterion are configured for RLM/BFD relaxation, the UE is allowed to perform RLM and/or BFD relaxation according to requirements specified in TS 38.133 [14] when both relaxed measurement criterion for low mobility and relaxed measurement criterion for good serving cell quality are met.

In case only the good serving cell quality criterion is configured for RLM/BFD relaxation, the UE is allowed to perform RLM and/or BFD relaxation according to requirements specified in TS 38.133 [14] when the relaxed measurement criterion for good serving cell quality is met.

5.7.13.1 Relaxed measurement criterion for low mobility

The relaxed measurement criterion for UE with low mobility in RRC_CONNECTED is fulfilled when:

- (SS-RSRP_{Ref} – SS-RSRP) < S_{SearchDeltaP-Connected},

Where:

- SS-RSRP = current L3 RSRP measurement of the SpCell based on SSB (dB).
- SS-RSRP_{Ref} = reference L3 RSRP measurement of the SpCell based on SSB (dB), set as follows:
 - After receiving low mobility criterion configuration, or
 - After MAC of the CG successfully completes a Random Access procedure after applying a reconfigurationWithSync in spCellConfig of the CG while low mobility criterion is configured, or
 - If $(SS-RSRP SS-RSRP_{Ref}) > 0$, or
 - If the relaxed measurement criterion has not been met for T_{SearchDeltaP-Connected}:
 - The UE shall set the value of SS-RSRP_{Ref} to the current SS-RSRP value of the SpCell.

5.7.13.2 Relaxed measurement criterion for good serving cell quality

The relaxed measurement criterion of good serving cell quality for RLM is fulfilled when the downlink radio link quality on the configured RLM-RS resource is evaluated to be better than the threshold $Q_{in}+XdB$, wherein

- Q_{in} is specified in clause 8.1 of TS 38.133 [14].
- X is the parameter *offset* in *goodServingCellEvaluationRLM*.

The relaxed measurement criterion of good serving cell quality for BFD is fulfilled when the downlink radio link quality on the configured BFD-RS resource is evaluated to be better than the threshold $Q_{in}+XdB$, wherein

- Q_{in} is specified in clause 8.1 of TS 38.133 [14].
- X is the parameter offset in goodServingCellEvaluationBFD.

5.7.14 UE Positioning Assistance Information

5.7.14.1 General

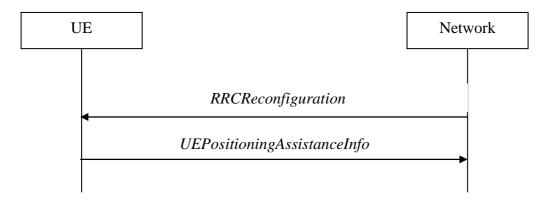


Figure 5.7.14.1-1: UE Positioning Assistance Information procedure

The UE Positioning Assistance Information procedure is used by UE to report the UE Positioning Assistance Information. The UE reports the association between UL-SRS resources for positioning and the UE Tx TEG ID as defined in TS 38.305 [73].

5.7.14.2 Initiation

A UE capable of providing the association between UL SRS Resource for positioning and UE Tx TEG ID in RRC_CONNECTED may initiate the procedure upon being configured to provide this association information.

Upon initiation of the procedure, the UE shall:

1> initiate transmission of the *UEPositioningAssistanceInfo* message in accordance with 5.7.14.3 to provide the association.

5.7.14.3 Actions related to transmission of *UEPositioningAssistanceInfo* message

The UE shall set the contents of the UEPositioningAssistanceInfo message as follows:

- 1> if ue-TxTEG-RequestUL-TDOA-Config in RRCReconfiguration message is configured with periodicReporting:
 - 2> for all the association changes store *ue-TxTEG-Association* corresponding to each *ue-TxTEG-ID* with *nr-TimeStamp*;
 - 2> include the results in *ue-TxTEG-AssociationList* in the *UEPositioningAssistanceInfo* message on expiry of each configured period;
 - 2> optionally include one ue-TxTEG-TimingErrorMarginValue for each UEPositioningAssistanceInfo message;
- 1> else if ue-TxTEG-RequestUL-TDOA-Config in RRCReconfiguration message is configured with oneShot:
 - 2> identify the *ue-TxTEG-Association* corresponding to each *ue-TxTEG-ID* with *nr-TimeStamp*;
 - 2> include the results in ue-TxTEG-AssociationList in the UEPositioningAssistanceInfo message only one time;
 - 2> optionally include one ue-TxTEG-TimingErrorMarginValue for each UEPositioningAssistanceInfo message.

The UE shall submit the UEPositioningAssistanceInfo message to lower layers for transmission.

5.7.15 Void

5.7.16 Application layer measurement reporting

5.7.16.1 General

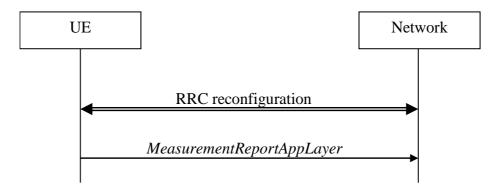


Figure 5.7.16.1-1: Application layer measurement reporting

The purpose of this procedure is to send application layer measurement reports to the network.

5.7.16.2 Initiation

A UE capable of application layer measurement reporting in RRC_CONNECTED may initiate the procedure when configured with application layer measurement, i.e. when *appLayerMeasConfig* and SRB4 have been configured by the network.

Upon initiating the procedure, the UE shall:

- 1> for each *measConfigAppLayerId* received from upper layers:
 - 2> if the UE AS has received application layer measurement report from upper layers which has not been transmitted; and
 - 2> if the application layer measurement reporting has not been suspended for the *measConfigAppLayerId* associated with the application layer measurement report according to clause 5.3.5.13d:
 - 3> set the *measReportAppLayerContainer* in the *MeasurementReportAppLayer* message to the received value in the application layer measurement report;
 - 2> set the *measConfigAppLayerId* in the *MeasurementReportAppLayer* message to the value of the *measConfigAppLayerId* received together with application layer measurement report information;
 - 2> if session start or stop information has been received from upper layers for the measConfigAppLayerId:
 - 3> set the *appLayerSessionStatus* in the *MeasurementReportAppLayer* message to the received value of session start or stop information;
 - 2> if RAN visible application layer measurement report has been received from upper layers:
 - 3> for each appLayerBufferLevel value in the received RAN visible application layer measurement report:
 - 4> set the appLayerBufferLevel values in the appLayerBufferLevelList in the MeasurementReportAppLayer message to the buffer level values received from the upper layer in the order with the first appLayerBufferLevel value set to the newest received buffer level value, the second appLayerBufferLevel value set to the second newest received buffer level value, and so on until all the buffer level values received from the upper layer have been assigned or the maximum number of values have been set according to appLayerBufferLevel, if configured;
 - 3> set the *playoutDelayForMediaStartup* in the *MeasurementReportAppLayer* message to the received value of playout delay for media startup in the RAN visible application layer measurement report, if any;

- 3> for each PDU session ID value indicated in the received RAN visible application layer measurement report, if any:
 - 4> set the *PDU-SessionID* field in the *pdu-SessionIdList* in the *MeasurementReportAppLayer* message to the indicated PDU session ID value;
- 1> if the encoded RRC message is larger than the maximum supported size of one PDCP SDU specified in TS 38.323 [5]:
 - 2> if the RRC message segmentation is enabled based on the field *rrc-SegAllowed* received in *appLayerMeasConfig*:
 - 3> initiate the UL message segment transfer procedure as specified in clause 5.7.7;
 - 2> else:
 - 3> discard the RRC message;
- 1> else:
 - 2> submit the MeasurementReportAppLayer message to lower layers for transmission upon which the procedure ends

5.7.17 Derivation of pathloss reference for TA validation of SRS for Positioning transmission and CG-SDT in RRC_INACTIVE

Upon request from lower layer for pathloss reference derivation for TA validation for SRS for Positioning transmission or CG-SDT in RRC_INACTIVE, the UE shall:

- 1> acquire SIB2, if stored version is invalid;
- 1> if nrofSS-BlocksToAverage or absThreshSS-BlocksConsolidation is not present or if absThreshSS-BlocksConsolidation is present and the highest beam measurement quantity value is below or equal to absThreshSS-BlocksConsolidation:
 - 2> derive the downlink pathloss reference RSRP for TA validation as the highest beam measurement quantity value, where each beam measurement quantity is described in TS 38.215 [24];
- 1> else:
 - 2> derive the downlink pathloss reference RSRP for TA validation as the linear average of the power values of up to *nrofSS-BlocksToAverage* of the highest beam measurement quantity values above *absThreshSS-BlocksConsolidation*, where each beam measurement quantity is described in TS 38.215 [24].

5.8 Sidelink

5.8.1 General

NR sidelink communication consists of unicast, groupcast and broadcast. For unicast, the PC5-RRC connection is a logical connection between a pair of a Source Layer-2 ID and a Destination Layer-2 ID in the AS. The PC5-RRC signalling, as specified in clause 5.8.9, can be initiated after its corresponding PC5 unicast link establishment (TS 23.287 [55]). The PC5-RRC connection and the corresponding sidelink SRBs and sidelink DRB(s) are released when the PC5 unicast link is released as indicated by upper layers.

For each PC5-RRC connection of unicast, one sidelink SRB (i.e. SL-SRB0) is used to transmit the PC5-S message(s) before the PC5-S security has been established. One sidelink SRB (i.e. SL-SRB1) is used to transmit the PC5-S messages to establish the PC5-S security. One sidelink SRB (i.e. SL-SRB2) is used to transmit the PC5-S messages after the PC5-S security has been established, which is protected. One sidelink SRB (i.e. SL-SRB3) is used to transmit the PC5-RRC signalling, which is protected and only sent after the PC5-S security has been established. One sidelink SRB (i.e. SL-SRB4) is used to transmit/receive the NR sidelink discovery messages.

For unicast of NR sidelink communication, AS security comprises of integrity protection of PC5 signalling (SL-SRB1, SL-SRB2 and SL-SRB3) and user data (SL-DRBs), and it further comprises of ciphering of PC5 signaling (SL-SRB1 only for the Direct Link Security Mode Complete message as specified in TS 24.587 [57] for V2X service or TS 24.554 [72] for Proximity-services, SL-SRB2 and SL-SRB3) and user data (SL-DRBs). The ciphering and integrity protection algorithms and parameters for a PC5 unicast link are exchanged by PC5-S messages in the upper layers as specified in TS 33.536 [60], and apply to the corresponding PC5-RRC connection in the AS. Once AS security is activated for a PC5 unicast link in the upper layers as specified in TS 33.536 [60], all messages on SL-SRB2 and SL-SRB3 and/or user data on SL-DRBs of the corresponding PC5-RRC connection are integrity protected and/or ciphered by the PDCP.

For unicast of NR sidelink communication, if the change of the key is indicated by the upper layers as specified in TS 24.587 [57] or TS 24.554 [72], UE re-establishes the PDCP entity of the SL-SRB1, SL-SRB2, SL-SRB3 and SL-DRBs on the corresponding PC5-RRC connection.

- NOTE 1: In case the configurations for NR sidelink communication are acquired via the E-UTRA, the configurations for NR sidelink communication in *SIB12* and *sl-ConfigDedicatedNR* within *RRCReconfiguration* used in clause 5.8 are provided by the configurations in *SystemInformationBlockType28* and *sl-ConfigDedicatedForNR* within *RRCConnectionReconfiguration* as specified in TS 36.331 [10], respectively.
- NOTE 2: In this release, there is one-to-one correspondence between the PC5-RRC connection and the PC5 unicast link as specified in TS 38.300[2].
- NOTE 3: All SL-DRBs related to the same PC5-RRC connection have the same activation/deactivation setting for ciphering and the same activation/deactivation setting for integrity protection as specified in TS 33.536 [60].
- NOTE 4: When integrity check failure concerning SL-SRB1 for a specific destination is detected, the UE sends an indication to the upper layers [57].
- NOTE 5: The selection of NULL algorithms means that the PC5 messages are considered protected for the purposes of being allowed to be sent or received.

5.8.2 Conditions for NR sidelink communication/discovery operation

The UE shall perform NR sidelink communication operation only if the conditions defined in this clause are met:

- 1> if the UE's serving cell is suitable (RRC_IDLE or RRC_INACTIVE or RRC_CONNECTED); and if either the selected cell on the frequency used for NR sidelink communication/discovery operation belongs to the registered or equivalent PLMN as specified in TS 24.587 [57] or TS 24.554 [72] or the UE is out of coverage on the frequency used for NR sidelink communication/discovery operation as defined in TS 38.304 [20] and TS 36.304 [27]; or
- 1> if the UE's serving cell (RRC_IDLE or RRC_CONNECTED) fulfils the conditions to support NR sidelink communication/discovery in limited service state as specified in TS 23.287 [55]; and if either the serving cell is on the frequency used for NR sidelink communication/discovery operation or the UE is out of coverage on the frequency used for NR sidelink communication/discovery operation as defined in TS 38.304 [20] and TS 36.304 [27]; or
- 1> if the UE has no serving cell (RRC_IDLE).

5.8.3 Sidelink UE information for NR sidelink communication/discovery

5.8.3.1 General

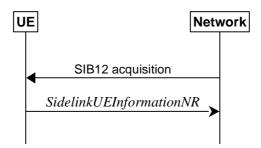


Figure 5.8.3.1-1: Sidelink UE information for NR sidelink communication/discovery

The purpose of this procedure is to inform the network that the UE:

- is interested or no longer interested to receive or transmit NR sidelink communication/discovery,
- is requesting assignment or release of transmission resource for NR sidelink communication/discovery,
- is reporting QoS parameters and QoS profile(s) related to NR sidelink communication,
- is reporting that a sidelink radio link failure or sidelink RRC reconfiguration failure has been detected,
- is reporting the sidelink UE capability information of the associated peer UE for unicast communication,
- is reporting the RLC mode information of the sidelink data radio bearer(s) received from the associated peer UE for unicast communication,
- is reporting the accepted sidelink DRX configuration received from the associated peer UE for NR sidelink unicast reception,
- is reporting the sidelink DRX assistance information received from the associated peer UE for NR sidelink unicast transmission, when the UE is configured with *sl-ScheduledConfig*,
- is reporting, for NR sidelink groupcast transmission, the sidelink DRX on/off indication for the associated Destination Layer-2 ID,
- is reporting, for NR sidelink groupcast or broadcast reception, the Destination Layer-2 ID and QoS profile(s) associated with its interested services to which sidelink DRX is applied,
- is reporting DRX configuration reject information from its associated peer UE for NR sidelink unicast transmission, when the UE is configured with *sl-ScheduledConfig*,
- is reporting parameters related to U2N relay operation.

5.8.3.2 Initiation

A UE capable of NR sidelink communication or NR sidelink discovery or NR sidelink U2N relay operation that is in RRC_CONNECTED may initiate the procedure to indicate it is (interested in) receiving or transmitting NR sidelink communication or NR sidelink discovery or NR sidelink U2N relay operation in several cases including upon successful connection establishment or resuming, upon change of interest, upon changing QoS profile(s), upon receiving *UECapabilityInformationSidelink* from the associated peer UE, upon RLC mode information updated from the associated peer UE or upon change to a PCell providing *SIB12* including *sl-ConfigCommonNR*. A UE capable of NR sidelink communication may initiate the procedure to request assignment of dedicated sidelink DRB configuration and transmission resources for NR sidelink communication transmission. A UE capable of NR sidelink communication may initiate the procedure to report to the network that a sidelink radio link failure or sidelink RRC reconfiguration failure has been declared. A UE capable of NR sidelink discovery may initiate the procedure to request assignment of dedicated resources for NR sidelink discovery transmission or NR sidelink discovery reception. A UE capable of U2N relay operation may initiate the procedure to report/update parameters for acting as U2N Relay UE or U2N Remote UE (including L2 Remote UE's source L2 ID).

A UE capable of NR sidelink operation that is in RRC_CONNECTED may initiate the procedure to report the sidelink DRX configuration received from the associated peer UE for NR sidelink unicast reception, upon accepting the sidelink DRX configuration from the associated peer UE. A UE capable of NR sidelink communication that is configured with *sl-ScheduledConfig* and is performing sidelink unicast transmission may initiate the procedure to report the sidelink DRX assistance information or the sidelink DRX configuration reject information received from the associated peer UE, upon receiving either of them from the associated peer UE. A UE capable of NR sidelink communication that is configured with *sl-ScheduledConfig* and is performing sidelink groupcast transmission may initiate the procedure to report the sidelink DRX on/off indication for the associated Destination Layer-2 ID.

A UE capable of NR sidelink operation that is in RRC_CONNECTED may initiate the procedure to report the Destination Layer-2 ID and QoS profile(s) associated with its interested service(s) that sidelink DRX is applied, for NR sidelink groupcast or broadcast reception.

Upon initiating this procedure, the UE shall:

- 1> if SIB12 including sl-ConfigCommonNR is provided by the PCell:
 - 2> ensure having a valid version of SIB12 for the PCell;
 - 2> if configured by upper layers to receive NR sidelink communication on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell:
 - 3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR*; or
 - 3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-RxInterestedFreqList*; or if the frequency configured by upper layers to receive NR sidelink communication on has changed since the last transmission of the *SidelinkUEInformationNR* message:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink communication reception frequency of interest in accordance with 5.8.3.3;

2> else:

- 3> if the last transmission of the SidelinkUEInformationNR message included sl-RxInterestedFreqList:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it is no longer interested in NR sidelink communication reception in accordance with 5.8.3.3;
- 2> if configured by upper layers to transmit non-relay NR sidelink communication on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell:
 - 3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR*; or
 - 3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-TxResourceReqList*; or if the information carried by the *sl-TxResourceReqList* has changed since the last transmission of the *SidelinkUEInformationNR* message:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink communication transmission resources required by the UE in accordance with 5.8.3.3;

- 3> if the last transmission of the SidelinkUEInformationNR message included sl-TxResourceReqList:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it no longer requires NR sidelink communication transmission resources in accordance with 5.8.3.3.

- 2> if configured by upper layer to receive NR sidelink non-relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-NonRelayDiscovery*:
 - 3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR* or connected to a PCell providing *SIB12* but not including *sl-NonRelayDiscovery*; or
 - 3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-RxInterestedFreqListDisc*; or if the frequency configured by upper layers to receive NR sidelink L2 U2N relay discovery messages or NR sidelink L3 U2N relay discovery messages on has changed since the last transmission of the *SidelinkUEInformationNR* message:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink discovery reception frequency of interest in accordance with 5.8.3.3;

- 3> if the last transmission of the SidelinkUEInformationNR message included sl-RxInterestedFreqListDisc:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it is no longer interested in NR sidelink discovery messages reception in accordance with 5.8.3.3;
- 2> if configured by upper layer to receive NR sidelink L2 U2N relay discovery messages on the frequency included in sl-FreqInfoList in SIB12 of the PCell including sl-L2U2N-Relay; or if configured by upper layer to receive NR sidelink L3 U2N relay discovery messages on the frequency included in sl-FreqInfoList in SIB12 of the PCell including sl-L3U2N-RelayDiscovery:
 - 3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR* or connected to a PCell providing *SIB12* but not including *sl-L2U2N-Relay* in case of L2 U2N relay operation or connected to a PCell providing *SIB12* but not including *sl-L3U2N-RelayDiscovery* in case of L3 U2N relay operation; or
 - 3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-RxInterestedFreqListDisc*; or if the frequency configured by upper layers to receive NR sidelink discovery messages on has changed since the last transmission of the *SidelinkUEInformationNR* message:
 - 4> if the UE is capable of U2N Relay UE, and if SIB12 includes sl-RelayUE-ConfigCommon; or
 - 4> if the UE is selecting a U2N Relay UE / has a selected U2N Relay UE / configured with measurement object associated to L2 U2N Relay UEs, and if SIB12 includes sl-RemoteUE-ConfigCommon:
 - 5> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR relay sidelink discovery reception frequency of interest in accordance with 5.8.3.3;

- 3> if the last transmission of the SidelinkUEInformationNR message included sl-RxInterestedFreqListDisc:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it is no longer interested in NR relay sidelink discovery messages reception in accordance with 5.8.3.3;
- 2> if configured by upper layer to transmit NR sidelink non-relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-NonRelayDiscovery*:
 - 3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR* or connected to a PCell providing *SIB12* but not including *sl-NonRelayDiscovery*; or

- 3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-TxResourceReqListDisc*; or if the information carried by the *sl-TxResourceReqListDisc* has changed since the last transmission of the *SidelinkUEInformationNR* message:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink non-relay discovery messages resources required by the UE in accordance with 5.8.3.3;

- 3> if the last transmission of the SidelinkUEInformationNR message included sl-TxResourceReqListDisc:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it no longer requires NR sidelink non-relay discovery messages resources in accordance with 5.8.3.3;
- 2> if configured by upper layer to transmit NR sidelink L2 U2N relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-L2U2N-Relay*; or if configured by upper layer to transmit NR sidelink L3 U2N relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-L3U2N-RelayDiscovery*:
 - 3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR* or connected to a PCell providing *SIB12* but not including *sl-L2U2N-Relay* in case L2 U2N relay operation or connected to a PCell providing *SIB12* but not including *sl-L3U2N-RelayDiscovery* in case of L3 U2N relay operation; or
 - 3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-TxResourceReqListDisc*; or if the information carried by the *sl-TxResourceReqListDisc* has changed since the last transmission of the *SidelinkUEInformationNR* message:
 - 4> if the UE is capable of U2N Relay UE, and if *SIB12* includes *sl-RelayUE-ConfigCommon*, and if the U2N Relay UE threshold conditions as specified in 5.8.14.2 are met; or
 - 4> if the UE is selecting a U2N Relay UE / has a selected U2N Relay UE, and if *SIB12* includes *sl-RemoteUE-ConfigCommon*, and if the U2N Remote UE threshold conditions as specified in 5.8.15.2 are met:
 - 5> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink relay discovery messages resources required by the UE in accordance with 5.8.3.3;

- 3> if the last transmission of the SidelinkUEInformationNR message included sl-TxResourceReqListDisc:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it no longer requires NR sidelink relay discovery messages resources in accordance with 5.8.3.3;
- 2> if configured by upper layer to transmit NR sidelink L2 U2N relay communication on the frequency included in sl-FreqInfoList in SIB12 of the PCell including sl-L2U2N-Relay or if configured by upper layer to transmit NR sidelink L3 U2N relay communication on the frequency included in sl-FreqInfoList in SIB12 of the PCell including sl-L3U2N-RelayDiscovery:
 - 3> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-ConfigCommonNR* or connected to a PCell providing *SIB12* but not including *sl-L2U2N-Relay* in case L2 U2N relay operation or connected to a PCell providing *SIB12* but not including *sl-L3U2N-RelayDiscovery* in case of L3 U2N relay operation; or
 - 3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-TxResourceReqL2U2N-Relay*; or if the information carried by the *sl-TxResourceReqL2U2N-Relay* has changed since the last transmission of the *SidelinkUEInformationNR* message; or if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-TxResourceReqL3U2N-Relay*; or if the

information carried by the *sl-TxResourceReqL3U2N-Relay* has changed since the last transmission of the *SidelinkUEInformationNR* message:

- 4> if the UE is capable of U2N Relay UE, and if SIB12 includes sl-RelayUE-ConfigCommon, and if the U2N Relay UE threshold conditions as specified in 5.8.14.2 are met; or
- 4> if the UE is selecting a U2N Relay UE / has a selected U2N Relay UE, and if SIB12 includes sl-RemoteUE-ConfigCommon, and if the U2N Remote UE threshold conditions as specified in 5.8.15.2 are met:
 - 5> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink relay communication transmission resources required by the UE in accordance with 5.8.3.3;

2> else:

- 3> if the last transmission of the *SidelinkUEInformationNR* message included *sl-TxResourceReqL2U2N-Relay* or *sl-TxResourceReqL3U2N-Relay*:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it no longer requires NR sidelink relay communication transmission resources in accordance with 5.8.3.3;
- 2> if configured by upper layers to perform NR sidelink reception on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell and if *sl-DRX-ConfigCommonGC-BC* is included in *SIB12-IEs*:
 - 3> if the UE received a sidelink DRX configuration in the *RRCReconfigurationSidelink* message for NR sidelink unicast reception from the associated peer UE and the UE accepted the sidelink DRX configuration:
 - 4> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or
 - 4> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-DRX-ConfigCommonGC-BC*; or
 - 4> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-RxDRX-ReportList*; or if the information carried by *sl-RxDRX-ReportList* has changed since the last transmission of the *SidelinkUEInformationNR* message:
 - 5> initiate transmission of the *SidelinkUEInformationNR* message to report the sidelink DRX configuration in accordance with 5.8.3.3;

3> else:

- 4> if the last transmission of the SidelinkUEInformationNR message included sl-RxDRX-ReportList:
 - 5> initiate transmission of the *SidelinkUEInformationNR* message to indicate the sidelink DRX configuration is no longer used in accordance with 5.8.3.3;
- 3> if the UE is performing NR sidelink groupcast or broadcast reception and is interested in a service that sidelink DRX is applied:
 - 4> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or
 - 4> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-DRX-ConfigCommonGC-BC*; or
 - 4> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-RxInterestedGC-BC-DestList*; or if the information carried by *sl-RxInterestedGC-BC-DestList* has changed since the last transmission of the *SidelinkUEInformationNR* message:
 - 5> initiate transmission of the *SidelinkUEInformationNR* message to report the Destination Layer-2 ID and QoS profile(s) associated with the service(s) in accordance with 5.8.3.3;

- 4> if the last transmission of the *SidelinkUEInformationNR* message included *sl-RxInterestedGC-BC-DestList*:
 - 5> initiate transmission of the *SidelinkUEInformationNR* message to indicate it is no longer interested in the service that sidelink DRX is applied in accordance with 5.8.3.3;
- 2> if configured by upper layers to perform NR sidelink transmission on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell and *if sl-DRX-ConfigCommonGC-BC* is included in *SIB12-IEs* and if the UE is configured with *sl-ScheduledConfig*:
 - 3> if the UE received a sidelink DRX assistance information or a sidelink DRX configuration reject information from the associated peer UE for NR sidelink unicast transmission:
 - 4> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or
 - 4> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-DRX-ConfigCommonGC-BC*; or
 - 4> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-DRX-InfoFromRxList* or *sl-FailureList*; or if the information carried by *sl-DRX-InfoFromRxList* or *sl-FailureList* has changed since the last transmission of the *SidelinkUEInformationNR* message:
 - 5> initiate transmission of the *SidelinkUEInformationNR* message to report the sidelink DRX assistance information or the sidelink DRX configuration reject information in accordance with 5.8.3.3;
 - 3> if the UE is performing NR sidelink groupcast transmission:
 - 4> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or
 - 4> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-DRX-ConfigCommonGC-BC*; or
 - 4> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-DRX-Indication*; or if the information carried by *sl-DRX-Indication* has changed since the last transmission of the *SidelinkUEInformationNR* message:
 - 5> initiate transmission of the *SidelinkUEInformationNR* message to report sidelink DRX on/off indication for the corresponding destination in accordance with 5.8.3.3;

5.8.3.3 Actions related to transmission of SidelinkUEInformationNR message

The UE shall set the contents of the SidelinkUEInformationNR message as follows:

- 1> if the UE initiates the procedure to indicate it is (no more) interested to receive NR sidelink communication; or
- 1> if the UE initiates the procedure to request (configuration/ release) of NR sidelink communication transmission resources or to report to the network that a sidelink radio link failure or sidelink RRC reconfiguration failure has been declared; or
- 1> if the UE initiates the procedure to report to the network the sidelink DRX configuration for NR sidelink unicast reception; or
- 1> if the UE initiates the procedure to report to the network the sidelink DRX assistance information or the sidelink DRX configuration reject information for NR sidelink unicast transmission; or
- 1> if the UE initiates the procedure to report to the network the Destination Layer-2 ID and QoS profile(s) associated with its interested service(s) that sidelink DRX is applied for NR sidelink groupcast or broadcast reception; or
- 1> if the UE initiates the procedure to report to the network the Destination Layer-2 ID and the sidelink DRX on/off indication for the corresponding destination for NR sidelink groupcast transmission; or

- 1> if the UE initiates the procedure to indicate it is (no more) interested to receive NR sidelink discovery messages; or
- 1> if the UE initiates the procedure to request (configuration/ release) of NR sidelink discovery messages transmission resources; or
- 1> if the UE initiates the procedure to request (configuration/ release) of NR sidelink U2N relay communication transmission resources (i.e. UE includes all concerned information, irrespective of what triggered the procedure):
 - 2> if SIB12 including sl-ConfigCommonNR is provided by the PCell:
 - 3> if configured by upper layers to receive NR sidelink communication:
 - 4> include sl-RxInterestedFreqList and set it to the frequency for NR sidelink communication reception;
 - 3> if configured by upper layers to transmit non-relay NR sidelink communication:
 - 4> include *sl-TxResourceReqList* and set its fields (if needed) as follows for each destination for which it requests network to assign NR sidelink communication resource:
 - 5> set *sl-DestinationIdentity* to the destination identity configured by upper layer for NR sidelink communication transmission;
 - 5> set *sl-CastType* to the cast type of the associated destination identity configured by the upper layer for the NR sidelink communication transmission;
 - 5> set *sl-RLC-ModeIndication* to include the RLC mode(s) and optionally QoS profile(s) of the sidelink QoS flow(s) of the associated RLC mode(s), if the associated bi-directional sidelink DRB has been established due to the configuration by *RRCReconfigurationSidelink*;
 - 5> set *sl-QoS-InfoList* to include QoS profile(s) of the sidelink QoS flow(s) of the associated destination configured by the upper layer for the NR sidelink communication transmission;
 - 5> set *sl-InterestedFreqList* to indicate the frequency of the associated destination for NR sidelink communication transmission;
 - 5> set *sl-TypeTxSyncList* to the current synchronization reference type used on the associated *sl-InterestedFreqList* for NR sidelink communication transmission.
 - 5> set *sl-CapabilityInformationSidelink* to include *UECapabilityInformationSidelink* message, if any, received from the associated peer UE.
 - 4> if a sidelink radio link failure or a sidelink RRC reconfiguration failure has been declared, according to clauses 5.8.9.3 and 5.8.9.1.8, respectively;
 - 5> include *sl-FailureList* and set its fields as follows for each destination for which it reports the NR sidelink communication failure:
 - 6> set *sl-DestinationIdentity* to the destination identity configured by upper layer for NR sidelink communication transmission;
 - 6> if the sidelink RLF is detected as specified in clause 5.8.9.3:
 - 7> set *sl-Failure* as *rlf* for the associated destination for the NR sidelink communication transmission;
 - 6> else if RRCReconfigurationFailureSidelink is received:
 - 7> set *sl-Failure* as *configFailure* for the associated destination for the NR sidelink communication transmission;
 - 3> if *SIB12* including *sl-NonRelayDiscovery* and if configured by upper layers to receive NR sidelink non-relay discovery messages, or if *SIB12* including *sl-L2U2N-Relay* and if configured by upper layers to receive NR sidelink L2 U2N relay discovery messages, or if *SIB12* including *sl-L3U2N-RelayDiscovery* and if configured by upper layers to receive NR sidelink L3 U2N relay discovery messages:

- 4> include *sl-RxInterestedFreqListDisc* and set it to the frequency for NR sidelink discovery messages reception;
- 4> if the UE is capable of L2 U2N remote UE:
 - 5> include *sl-SourceIdentityRemoteUE* and set it to the source identity configured by upper layer for NR sidelink L2 U2N relay communication transmission;
- 3> if *SIB12* including *sl-NonRelayDiscovery* and if configured by upper layers to transmit NR sidelink non-relay discovery messages, or if *SIB12* including *sl-L2U2N-Relay* and if configured by upper layers to transmit NR sidelink L2 U2N relay discovery messages, or if *SIB12* including *sl-L3U2N-RelayDiscovery* and if configured by upper layers to transmit NR sidelink L3 U2N relay discovery messages:
 - 4> include *sl-TxResourceReqListDisc* and set its fields (if needed) as follows for each destination for which it requests network to assign NR sidelink discovery messages resource:
 - 5> set *sl-DestinationIdentityDisc* to the destination identity configured by upper layer for NR sidelink discoverymessages transmission;
 - 5> if the UE is acting as L2 U2N Relay UE:
 - 6> set *sl-SourceIdentityRelayUE* to the source identity configured by upper layer for NR sidelink L2 U2N relay discovery messages transmission;
 - 5> set *sl-CastTypeDisc* to the cast type of the associated destination identity for the NR sidelink discovery messages transmission;
 - 5> set *sl-TxInterestedFreqListDisc* to indicate the frequency of the associated destination for NR sidelink discovery messages transmission;
 - 5> set *sl-TypeTxSyncListDisc* to the current synchronization reference type used on the associated *sl-InterestedFreqList* for NR sidelink discovery messages transmission;
 - 5> set *sl-DiscoveryType* to the current discovery type of the associated destination identity configured by the upper layer for NR sidelink discovery messages transmission;
- 3> if *SIB12* including *sl-L2U2N-Relay* and if configured by upper layers to transmit NR sidelink L2 U2N relay communication and the UE is acting as L2 U2N Relay UE:
 - 4> include sl-TxResourceReqL2U2N-Relay in sl-TxResourceReqListCommRelay and set its fields (if needed) as follows for each destination for which it requests network to assign NR sidelink L2 U2N relay communication resource:
 - 5> set *sl-DestinationIdentityL2U2N* to the destination identity configured by upper layer for NR sidelink L2 U2N relay communication transmission;
 - 5> set *sl-TxInterestedFreqListL2U2N* to indicate the frequency of the associated destination for NR sidelink L2 U2N relay communication transmission;
 - 5> set *sl-TypeTxSyncListL2U2N* to the current synchronization reference type used on the associated *sl-InterestedFreqListL2U2N* for NR sidelink L2 U2N relay communication transmission;
 - 5> set sl-LocalID-Request to request local ID for L2 U2N Remote UE;
 - 5> set *sl-PagingIdentityRemoteUE* to the paging UE ID received from peer L2 U2N Remote UE, if it is not released as in 5.8.9.8.3;
 - 5> set *sl-CapabilityInformationSidelink* to include *UECapabilityInformationSidelink* message, if any, received from peer UE.
 - 4> include *ue-Type* and set it to *relayUE*;
- 3> if *SIB12* including *sl-L2U2N-Relay* and if configured by upper layers to transmit NR sidelink L2 U2N relay communication and the UE has a selected L2 U2N Relay UE:

- 4> include *sl-TxResourceReqL2U2N-Relay* in *sl-TxResourceReqListCommRelay* and set its fields (if needed) as follows to request network to assign NR sidelink L2 U2N relay communication resource:
 - 5> set *sl-TxInterestedFreqListL2U2N* to indicate the frequency of the associated destination for NR sidelink L2 U2N relay communication transmission;
 - 5> set *sl-TypeTxSyncListL2U2N* to the current synchronization reference type used on the associated *sl-InterestedFreqListL2U2N* for NR sidelink L2 U2N relay communication transmission;
 - 5> set *sl-CapabilityInformationSidelink* to include *UECapabilityInformationSidelink* message, if any, received from peer UE.
- 4> include *ue-Type* and set it to *remoteUE*;
- 3> if *SIB12* including *sl-L3U2N-RelayDiscovery* and if configured by upper layers to transmit NR sidelink L3 U2N relay communication:
 - 4> include sl-TxResourceReqL3U2N-Relay in sl-TxResourceReqListCommRelay and set its fields (if needed) as follows for each destination for which it requests network to assign NR sidelink L3 U2N relay communication resource:
 - 5> set *sl-DestinationIdentity* to the destination identity configured by upper layer for NR sidelink L3 U2N relay communication transmission;
 - 5> set *sl-CastType* to the cast type of the associated destination identity configured by the upper layer for the NR sidelink L3 U2N relay communication transmission;
 - 5> set *sl-RLC-ModeIndication* to include the RLC mode(s) and optionally QoS profile(s) of the sidelink QoS flow(s) of the associated RLC mode(s), if the associated bi-directional sidelink DRB has been established due to the configuration by *RRCReconfigurationSidelink*;
 - 5> set *sl-QoS-InfoList* to include QoS profile(s) of the sidelink QoS flow(s) of the associated destination configured by the upper layer for the NR sidelink L3 U2N relay communication transmission;
 - 5> set *sl-TxInterestedFreqList* to indicate the frequency of the associated destination for NR sidelink L3 U2N relay communication transmission;
 - 5> set *sl-TypeTxSyncList* to the current synchronization reference type used on the associated *sl-InterestedFreqList* for NR sidelink L3 U2N relay communication transmission.
 - 5> set *sl-CapabilityInformationSidelink* to include *UECapabilityInformationSidelink* message, if any, received from peer UE.
 - 4> include *ue-Type* and set it to *relayUE* if the UE is acting as NR sidelink L3 U2N Relay UE or to *remoteUE* otherwise;
- 3> if sl-DRX-ConfigCommonGC-BC is included in SIB12-IEs:
 - 4> if configured by upper layers to perform NR sidelink reception:
 - 5> include *sl-RxDRX-ReportList* and set its fields (if needed) as follows for each destination for which it reports to network:
 - 6> set *sl-DRX-ConfigFromTx* to include the accepted sidelink DRX configuration of the associated destination for NR sidelink unicast communication, if received from the associated peer UE;
 - 5> include *sl-RxInterestedGC-BC-DestList* and set its fields (if needed) as follows for each Destination Layer-2 ID for which it reports to network:
 - 6> set *sl-RxInterestedQoS-InfoList* to include the QoS profile of its interested service(s) that sidelink DRX is applied for the associated destination for NR sidelink groupcast or broadcast reception;

- NOTE: It is up to UE implementation to set the QoS profile in *sl-RxInterestedQoS-InfoList* for reception of NR sidelink discovery message or ProSe Direct Link Establishment Request message as described in TS 24.554 [72], or for reception of Direct Link Establishment Request message as described in TS 24.587 [57].
 - 6> set *sl-DestinationIdentity* to the associated destination identity configured by upper layer for NR sidelink groupcast or broadcast reception;
 - 4> if configured by upper layers to perform NR sidelink transmission and configured with *sl-ScheduledConfig*:
 - 5> include *sl-TxResourceReqList* and/or *sl-TxResourceReqListCommRelay* and set its fields (if needed) as follows for each destination for which it reports to network:
 - 6> set *sl-DRX-InfoFromRxList* to include the sidelink DRX assistance information of the associated destination, if any, received from the associated peer UE;
 - 6> if the RRCReconfigurationCompleteSidelink message includes the sl-DRX-ConfigReject:
 - 7> set *sl-Failure* as *drxReject-v1710* for the associated destination for the NR sidelink communication transmission;
 - 6> set *sl-DRX-Indication* to include the sidelink DRX on/off indication for the associated destination for NR sidelink groupcast transmission;
- 1> if the UE initiates the procedure while connected to an E-UTRA PCell:
 - 2> submit the *SidelinkUEInformationNR* to lower layers via SRB1, embedded in E-UTRA RRC message *ULInformationTransferIRAT* as specified in TS 36.331 [10], clause 5.6.28;

2> submit the *SidelinkUEInformationNR* message to lower layers for transmission.

5.8.4 Void

5.8.5 Sidelink synchronisation information transmission for NR sidelink communication/discovery

5.8.5.1 General

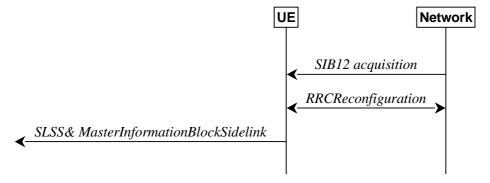


Figure 5.8.5.1-1: Synchronisation information transmission for NR sidelink communication/discovery, in (partial) coverage

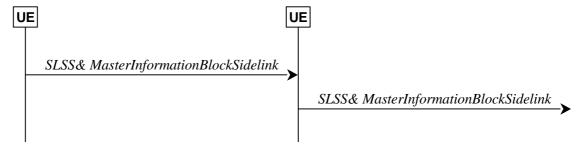


Figure 5.8.5.1-2: Synchronisation information transmission for NR sidelink communication/discovery, out of coverage

The purpose of this procedure is to provide synchronisation information to a UE. This procedure also applies to NR sidelink discovery.

5.8.5.2 Initiation

A UE capable of NR sidelink communication/discovery and SLSS/PSBCH transmission shall, when transmitting NR sidelink communication/discovery, and if the conditions for NR sidelink communication/discovery operation are met and when the following conditions are met:

- 1> if in coverage on the frequency used for NR sidelink communication/discovery, as defined in TS 38.304 [20]; and has selected GNSS or the cell as synchronization reference as defined in 5.8.6.3; or
- 1> if out of coverage on the frequency used for NR sidelink communication/discovery, and the frequency used to transmit NR sidelink communication/discovery is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-FreqInfoList* within *SIB12*; and has selected GNSS or the cell as synchronization reference as defined in 5.8.6.3:
 - 2> if in RRC_CONNECTED; and if networkControlledSyncTx is configured and set to on; or
 - 2> if networkControlledSyncTx is not configured; and for the concerned frequency syncTxThreshIC is configured; and the RSRP measurement of the reference cell, selected as defined in 5.8.6.3, for NR sidelink communication/discovery transmission is below the value of syncTxThreshIC:
 - 3> transmit sidelink SSB on the frequency used for NR sidelink communication/discovery in accordance with 5.8.5.3 and TS 38.211 [16], including the transmission of SLSS as specified in 5.8.5.3 and transmission of *MasterInformationBlockSidelink* as specified in 5.8.9.4.3;

1> else:

- 2> for the frequency used for NR sidelink communication/discovery, if syncTxThreshOoC is included in SidelinkPreconfigNR; and the UE is not directly synchronized to GNSS, and the UE has no selected SyncRef UE or the PSBCH-RSRP measurement result of the selected SyncRef UE is below the value of syncTxThreshOoC; or
- 2> for the frequency used for NR sidelink communication/discovery, if the UE selects GNSS as the synchronization reference source:
 - 3> transmit sidelink SSB on the frequency used for NR sidelink communication/discovery in accordance with TS 38.211 [16], including the transmission of SLSS as specified in 5.8.5.3 and transmission of *MasterInformationBlockSidelink* as specified in 5.8.9.4.3;

5.8.5.3 Transmission of SLSS

The UE shall select the SLSSID and the slot in which to transmit SLSS as follows:

- 1> if triggered by NR sidelink communication/discovery and in coverage on the frequency used for NR sidelink communication/discovery, as defined in TS 38.304 [20]; or
- 1> if triggered by NR sidelink communication/discovery, and out of coverage on the frequency used for NR sidelink communication/discovery, and the concerned frequency is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-FreqInfoList* within *SIB12*:

- 2> if the UE has selected GNSS as synchronization reference in accordance with 5.8.6.2:
 - 3> select SLSSID 0;
 - 3> use *sl-SSB-TimeAllocation1* included in the entry of configured *sl-SyncConfigList* corresponding to the concerned frequency, that includes *txParameters* and *gnss-Sync*;
 - 3> select the slot(s) indicated by *sl-SSB-TimeAllocation1*;
- 2> if the UE has selected a cell as synchronization reference in accordance with 5.8.6.2:
 - 3> select the SLSSID included in the entry of configured *sl-SyncConfigList* corresponding to the concerned frequency, that includes *txParameters* and does not include *gnss-Sync*;
 - 3> select the slot(s) indicated by *sl-SSB-TimeAllocation1*;
- 1> else if triggered by NR sidelink communication/discovery and the UE has GNSS as the synchronization reference:
 - 2> select SLSSID 0;
 - 2> if sl-SSB-TimeAllocation3 is configured for the frequency used in SidelinkPreconfigNR:
 - 3> select the slot(s) indicated by sl-SSB-TimeAllocation3;
 - 2> else:
 - 3> select the slot(s) indicated by *sl-SSB-TimeAllocation1*;
- 1> else:
 - 2> select the synchronisation reference UE (i.e. SyncRef UE) as defined in 5.8.6;
 - 2> if the UE has a selected SyncRef UE and *inCoverage* in the *MasterInformationBlockSidelink* message received from this UE is set to *true*; or
 - 2> if the UE has a selected SyncRef UE and *inCoverage* in the *MasterInformationBlockSidelink* message received from this UE is set to *false* while the SLSS from this UE is part of the set defined for out of coverage, see TS 38.211 [16]:
 - 3> select the same SLSSID as the SLSSID of the selected SyncRef UE;
 - 3> select the slot in which to transmit the SLSS according to the *sl-SSB-TimeAllocation1* or *sl-SSB-TimeAllocation2* included in the preconfigured sidelink parameters corresponding to the concerned frequency, such that the timing is different from the SLSS of the selected SyncRef UE;
 - 2> else if the UE has a selected SyncRef UE and the SLSS from this UE was transmitted on the slot(s) indicated *sl-SSB-TimeAllocation3*, which is configured for the frequency used in *SidelinkPreconfigNR*:
 - 3> select SLSSID 337;
 - 3> select the slot(s) indicated by sl-SSB-TimeAllocation2;
 - 2> else if the UE has a selected SyncRef UE:
 - 3> select the SLSSID from the set defined for out of coverage having an index that is 336 more than the index of the SLSSID of the selected SyncRef UE, see TS 38.211 [16];
 - 3> select the slot in which to transmit the SLSS according to *sl-SSB-TimeAllocation1* or *sl-SSB-TimeAllocation2* included in the preconfigured sidelink parameters corresponding to the concerned frequency, such that the timing is different from the SLSS of the selected SyncRef UE;
 - 2> else (i.e. no SyncRef UE selected):
 - 3> if the UE has not randomly selected an SLSSID:

- 4> randomly select, using a uniform distribution, an SLSSID from the set of sequences defined for out of coverage except SLSSID 336 and 337, see TS 38.211 [16];
- 4> select the slot in which to transmit the SLSS according to the *sl-SSB-TimeAllocation1* or *sl-SSB-TimeAllocation2* (arbitrary selection between these) included in the preconfigured sidelink parameters in *SidelinkPreconfigNR* corresponding to the concerned frequency;

5.8.5a Sidelink synchronisation information transmission for V2X sidelink communication

5.8.5a.1 General

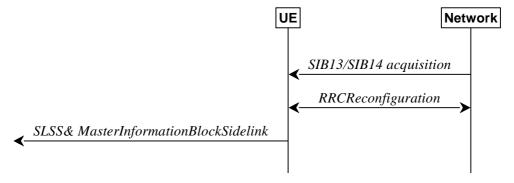


Figure 5.8.5a.1-1: Synchronisation information transmission for V2X sidelink communication, in (partial) coverage

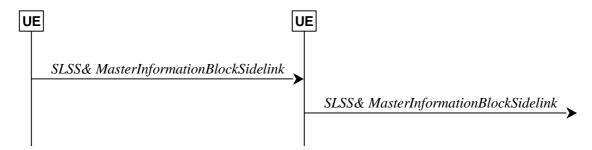


Figure 5.8.5a.1-2: Synchronisation information transmission for V2X sidelink communication, out of coverage

The purpose of this procedure is to provide synchronisation information to a UE.

5.8.5a.2 Initiation

A UE capable of V2X sidelink communication initiates the transmission of SLSS and *MasterInformationBlock-SL-V2X* according to the conditions and the procedures specified for V2X sidelink communication in clause 5.10.7 of TS 36.331 [10].

NOTE 1: When applying the procedure in this clause, SIB13 and SIB14 correspond to SystemInformationBlockType21 and SystemInformationBlockType26 specified in TS 36.331 [10] respectively

5.8.6 Sidelink synchronisation reference

5.8.6.1 General

The purpose of this procedure is to select a synchronisation reference and used when transmitting NR sidelink communication/discovery. This procedure also applies to NR sidelink discovery.

5.8.6.2 Selection and reselection of synchronisation reference

The UE shall:

- 1> if the frequency used for NR sidelink communication/discovery is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-ConfigCommonNR* within *SIB12*, and *sl-SyncPriority* is configured for the concerned frequency and set to *gnbEnb*:
 - 2> select a cell as the synchronization reference source as defined in 5.8.6.3:
- NOTE 1: When *sl-SyncPriority* in SIB12 is set to *gnbEnb*, the choice of synchronisation source for an out of coverage L2 U2N Remote UE is left to UE implementation.
- 1> else if the frequency used for NR sidelink communication/discovery is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-ConfigCommonNR* within *SIB12*, and *sl-SyncPriority* for the concerned frequency is not configured or is set to *gnss*, and GNSS is reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14]:
 - 2> select GNSS as the synchronization reference source;
- 1> else if the frequency used for NR sidelink communication/discovery is included in *SL-PreconfigurationNR*, and *sl-SyncPriority* in *SidelinkPreconfigNR* is set to *gnss* and GNSS is reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14]:
 - 2> select GNSS as the synchronization reference source;

- 2> perform a full search (i.e. covering all subframes and all possible SLSSIDs) to detect candidate SLSS, in accordance with TS 38.133 [14]
- 2> when evaluating the one or more detected SLSSIDs, apply layer 3 filtering as specified in 5.5.3.2 using the preconfigured *sl-filterCoefficient*, before using the PSBCH-RSRP measurement results;
- 2> if the UE has selected a SyncRef UE:
 - 3> if the PSBCH-RSRP of the strongest candidate SyncRef UE exceeds the minimum requirement TS 38.133 [14] by *sl-SyncRefMinHyst* and the strongest candidate SyncRef UE belongs to the same priority group as the current SyncRef UE and the PSBCH-RSRP of the strongest candidate SyncRef UE exceeds the PSBCH-RSRP of the current SyncRef UE by *syncRefDiffHyst*; or
 - 3> if the PSBCH-RSRP of the candidate SyncRef UE exceeds the minimum requirement TS 38.133 [14] by *sl-SyncRefMinHyst* and the candidate SyncRef UE belongs to a higher priority group than the current SyncRef UE; or
 - 3> if GNSS becomes reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14], and GNSS belongs to a higher priority group than the current SyncRef UE; or
 - 3> if a cell is detected and gNB/eNB (if *sl-NbAsSync* is set to *true*) belongs to a higher priority group than the current SyncRef UE; or
 - 3> if the PSBCH-RSRP of the current SyncRef UE is less than the minimum requirement defined in TS 38.133 [14]:
 - 4> consider no SyncRef UE to be selected;
- 2> if the UE has selected GNSS as the synchronization reference for NR sidelink communication/discovery:
 - 3> if the PSBCH-RSRP of the candidate SyncRef UE exceeds the minimum requirement defined in TS 38.133 [14] by *sl-SyncRefMinHyst* and the candidate SyncRef UE belongs to a higher priority group than GNSS; or
 - 3> if GNSS becomes not reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14]:
 - 4> consider GNSS not to be selected;

- 2> if the UE has selected cell as the synchronization reference for NR sidelink communication/discovery:
 - 3> if the PSBCH-RSRP of the candidate SyncRef UE exceeds the minimum requirement defined in TS 38.133 [14] by *sl-SyncRefMinHyst* and the candidate SyncRef UE belongs to a higher priority group than gNB/eNB; or
 - 3> if the selected cell is not detected:
 - 4> consider the cell not to be selected;
- 2> if the UE has not selected any synchronization reference:
 - 3> if the UE detects one or more SLSSIDs for which the PSBCH-RSRP exceeds the minimum requirement defined in TS 38.133 [14] by *sl-SyncRefMinHyst* and for which the UE received the corresponding *MasterInformationBlockSidelink* message (candidate SyncRef UEs), or if the UE detects GNSS that is reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14], or if the UE detects a cell, select a synchronization reference according to the following priority group order:
 - 4> if *sl-SyncPriority* corresponding to the concerned frequency is set to *gnbEnb*:
 - 5> UEs of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *true*, starting with the UE with the highest PSBCH-RSRP result (priority group 1);
 - 5> UE of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCH-RSRP result (priority group 2);
 - 5> GNSS that is reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14] (priority group 3);
 - 5> UEs of which SLSSID is 0, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *true*, or of which SLSSID is 0 and SLSS is transmitted on slot(s) indicated by *sl-SSB-TimeAllocation3*, starting with the UE with the highest PSBCH-RSRP result (priority group 4);
 - 5> UEs of which SLSSID is 0 and SLSS is not transmitted on slot(s) indicated by *sl-SSB-TimeAllocation3*, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCH-RSRP result (priority group 5);
 - 5> UEs of which SLSSID is 337 and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCH-RSRP result (priority group 5);
 - 5> Other UEs, starting with the UE with the highest PSBCH-RSRP result (priority group 6);
 - 4> if *sl-SyncPriority* corresponding to the concerned frequency is set to *gnss*, and *sl-NbAsSync* is set to *true*:
 - 5> UEs of which SLSSID is 0, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *true*, or of which SLSSID is 0 and SLSS is transmitted on slot(s) indicated by *sl-SSB-TimeAllocation3*, starting with the UE with the highest PSBCH-RSRP result (priority group 1);
 - 5> UEs of which SLSSID is 0 and SLSS is not transmitted on slot(s) indicated by *sl-SSB-TimeAllocation3*, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCHS-RSRP result (priority group 2);
 - 5> UEs of which SLSSID is 337 and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCH-RSRP result (priority group 2);
 - 5> the cell detected by the UE as defined in 5.8.6.3 (priority group 3);

- 5> UEs of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *true*, starting with the UE with the highest PSBCH-RSRP result (priority group 4);
- 5> UE of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCH-RSRP result (priority group 5);
- 5> Other UEs, starting with the UE with the highest S-RSRP result (priority group 6);
- 4> if *sl-SyncPriority* corresponding to the concerned frequency is set to *gnss*, and *sl-NbAsSync* is set to *false*:
 - 5> UEs of which SLSSID is 0, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *true*, or of which SLSSID is 0 and SLSS is transmitted on slot(s) indicated by *sl-SSB-TimeAllocation3*, starting with the UE with the highest PSBCH-RSRP result (priority group 1);
 - 5> UEs of which SLSSID is 0 and SLSS is not transmitted on slot(s) indicated by *sl-SSB-TimeAllocation3*, and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCHS-RSRP result (priority group 2);
 - 5> UEs of which SLSSID is 337 and *inCoverage*, included in the *MasterInformationBlockSidelink* message received from this UE, is set to *false*, starting with the UE with the highest PSBCH-RSRP result (priority group 2);
 - 5> Other UEs, starting with the UE with the highest PSBCH-RSRP result (priority group 3);
- NOTE 2: How the UE achieves subframe boundary alignment between V2X sidelink communication and NR sidelink communication/discovery (if both are performed by the UE) is as specified in TS 38.213, clause 16.7.

5.8.6.3 Sidelink communication transmission reference cell selection

A UE capable of NR sidelink communication/discovery that is configured by upper layers to transmit NR sidelink communication/discovery shall:

- 1> for the frequency used to transmit NR sidelink communication/discovery, select a cell to be used as reference for synchronization in accordance with the following:
 - 2> if the frequency concerns the primary frequency:
 - 3> use the PCell or the serving cell as reference;
 - 2> else if the frequency concerns a secondary frequency:
 - 3> use the concerned SCell as reference;
 - 2> else if the UE is in coverage of the concerned frequency:
 - 3> use the DL frequency paired with the one used to transmit NR sidelink communication/discovery as reference;
 - 2> else (i.e., out of coverage on the concerned frequency):
 - 3> use the PCell or the serving cell as reference, if needed;

5.8.7 Sidelink communication reception

A UE capable of NR sidelink communication that is configured by upper layers to receive NR sidelink communication shall:

1> if the conditions for NR sidelink communication operation as defined in 5.8.2 are met:

- 2> if the frequency used for NR sidelink communication is included in *sl-FreqInfoToAddModList* in *RRCReconfiguration* message or *sl-FreqInfoList* included in *SIB12*:
 - 3> if the UE is configured with *sl-RxPool* included in *RRCReconfiguration* message with *reconfigurationWithSync* (i.e. handover):
 - 4> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources indicated by *sl-RxPool*;
 - 3> else if the cell chosen for NR sidelink communication provides SIB12:
 - 4> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources indicated by *sl-RxPool in SIB12*;

3> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources that were preconfigured by *sl-RxPool* in *SL-PreconfigurationNR*, as defined in clause 9.3;

5.8.8 Sidelink communication transmission

A UE capable of NR sidelink communication that is configured by upper layers to transmit NR sidelink communication and has related data to be transmitted shall:

- 1> if the conditions for NR sidelink communication operation as defined in 5.8.2 are met:
 - 2> if the frequency used for NR sidelink communication is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-ConfigCommonNR* within *SIB12*:
 - 3> if the UE is in RRC_CONNECTED and uses the frequency included in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message:
 - 4> if the UE is configured with *sl-ScheduledConfig*:
 - 5> if T310 for MCG or T311 is running; and if *sl-TxPoolExceptional* is included in *sl-FreqInfoList* for the concerned frequency in *SIB12* or included in *sl-ConfigDedicatedNR* in *RRCReconfiguration*; or
 - 5> if T301 is running and the cell on which the UE initiated RRC connection re-establishment provides *SIB12* including *sl-TxPoolExceptional* for the concerned frequency; or
 - 5> if T304 for MCG is running and the UE is configured with *sl-TxPoolExceptional* included in *sl-ConfigDedicatedNR* for the concerned frequency in *RRCReconfiguration*:
 - 6> configure lower layers to perform the sidelink resource allocation mode 2 based on random selection using the pool of resources indicated by *sl-TxPoolExceptional* as defined in TS 38.321 [3];
 - 5> else:
 - 6> configure lower layers to perform the sidelink resource allocation mode 1 for NR sidelink communication;
 - 5> if T311 is running, configure the lower layers to release the resources indicated by *rrc-ConfiguredSidelinkGrant* (if any);
 - 4> if the UE is configured with *sl-UE-SelectedConfig*:
 - 5> if a result of full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in *sl-TxPoolSelectedNormal* for the concerned frequency included in *sl-ConfigDedicatedNR* within *RRCReconfiguration* is not available in accordance with TS 38.214 [19];
 - 6> if sl-TxPoolExceptional for the concerned frequency is included in RRCReconfiguration; or

- 6> if the PCell provides SIB12 including sl-TxPoolExceptional in sl-FreqInfoList for the concerned frequency:
 - 7> configure lower layers to perform the sidelink resource allocation mode 2 based on random selection using the pool of resources indicated by *sl-TxPoolExceptional* as defined in TS 38.321 [3];
- 5> else, if the *sl-TxPoolSelectedNormal* for the concerned frequency is included in the *sl-ConfigDedicatedNR* within *RRCReconfiguration*:
 - 6> configure lower layers to perform the sidelink resource allocation mode 2 based on resource selection operation according to *sl-AllowedResourceSelectionConfig* (as defined in TS 38.321 [3] and TS 38.214 [19]) using the pools of resources indicated by *sl-TxPoolSelectedNormal* for the concerned frequency;

- 4> if the cell chosen for NR sidelink communication transmission provides SIB12:
 - 5> if *SIB12* includes *sl-TxPoolSelectedNormal* for the concerned frequency, and a result of full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in the *sl-TxPoolSelectedNormal* is available in accordance with TS 38.214 [19] or random selection, if allowed by *sl-AllowedResourceSelectionConfig*, is selected:
 - 6> configure lower layers to perform the sidelink resource allocation mode 2 based on resource selection operation according to *sl-AllowedResourceSelectionConfig* using the pools of resources indicated by *sl-TxPoolSelectedNormal* for the concerned frequency as defined in TS 38.321 [3];
 - 5> else if *SIB12* includes *sl-TxPoolExceptional* for the concerned frequency:
 - 6> from the moment the UE initiates RRC connection establishment or RRC connection resume, until receiving an *RRCReconfiguration* including *sl-ConfigDedicatedNR*, or receiving an *RRCRelease* or an *RRCReject*; or
 - 6> if a result of full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in *sl-TxPoolSelectedNormal* for the concerned frequency in *SIB12* is not available in accordance with TS 38.214 [19]:
 - 7> configure lower layers to perform the sidelink resource allocation mode 2 based on random selection (as defined in TS 38.321 [3]) using the pool of resources indicated by *sl-TxPoolExceptional* for the concerned frequency;

2> else:

- 3> configure lower layers to perform the sidelink resource allocation mode 2 based on resource selection operation according to *sl-AllowedResourceSelectionConfig* (as defined in TS 38.321 [3] and TS 38.214 [19]) using the pools of resources indicated by *sl-TxPoolSelectedNormal* in *SidelinkPreconfigNR* for the concerned frequency.
- NOTE 1: The UE continues to use resources configured in *rrc-ConfiguredSidelinkGrant* (while T310 is running) until it is released (i.e. until T310 has expired). The UE does not use sidelink configured grant type 2 resources while T310 is running.
- NOTE 2: In case of RRC reconfiguration with sync, the UE uses resources configured in *rrc-ConfiguredSidelinkGrant* (while T304 on the MCG is running) if provided by the target cell.
- NOTE 3: It is up to UE implementation to determine, in accordance with TS 38.321[3], which resource pool to use if multiple resource pools are configured, and which resource allocation scheme is used in the AS based on UE capability (for a UE in RRC_IDLE/RRC_INACTIVE) and the allowed resource schemes *sl-AllowedResourceSelectionConfig* in the resource pool configuration.

If configured to perform sidelink resource allocation mode 2, the UE capable of NR sidelink communication that is configured by upper layers to transmit NR sidelink communication shall perform resource selection operation according to *sl-AllowedResourceSelectionConfig* on all pools of resources which may be used for transmission of the sidelink

control information and the corresponding data. The pools of resources are indicated by *SidelinkPreconfigNR*, *sl-TxPoolSelectedNormal* in *SlB12* for the concerned frequency, as configured above.

5.8.9 Sidelink RRC procedure

5.8.9.1 Sidelink RRC reconfiguration

5.8.9.1.1 General

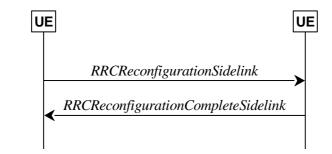


Figure 5.8.9.1.1-1: Sidelink RRC reconfiguration, successful



Figure 5.8.9.1.1-2: Sidelink RRC reconfiguration, failure

The purpose of this procedure is to modify a PC5-RRC connection, e.g. to establish/modify/release sidelink DRBs or PC5 Relay RLC channels, to (re-)configure NR sidelink measurement and reporting, to (re-)configure sidelink CSI reference signal resources, to (re)configure CSI reporting latency bound, to (re)configure sidelink DRX, and to (re)configure the latency bound of SL Inter-UE coordination report.

The UE may initiate the sidelink RRC reconfiguration procedure and perform the operation in clause 5.8.9.1.2 on the corresponding PC5-RRC connection in following cases:

- the release of sidelink DRBs associated with the peer UE, as specified in clause 5.8.9.1a.1;
- the establishment of sidelink DRBs associated with the peer UE, as specified in clause 5.8.9.1a.2;
- the modification for the parameters included in *SLRB-Config* of sidelink DRBs associated with the peer UE, as specified in clause 5.8.9.1a.2;
- the release of PC5 Relay RLC channels for L2 U2N Relay UE and Remote UE, as specified in clause 5.8.9.7.1;
- the establishment of PC5 Relay RLC channels for L2 U2N Relay UE and Remote UE, as specified in clause 5.8.9.7.2:
- the modification for the parameters included in *SL-RLC-ChannelConfigPC5* of PC5 Relay RLC channels for L2 U2N Relay UE and Remote UE, as specified in clause 5.8.9.7.2;
- the (re-)configuration of the peer UE to perform NR sidelink measurement and report.

- the (re-)configuration of the sidelink CSI reference signal resources and CSI reporting latency bound;
- the (re-)configuration of the peer UE to perform sidelink DRX;
- the (re-)configuration of the latency bound of SL Inter-UE coordination report.

In RRC_CONNECTED, the UE applies the NR sidelink communications parameters provided in *RRCReconfiguration* (if any). In RRC_IDLE or RRC_INACTIVE, the UE applies the NR sidelink communications parameters provided in system information (if any). For other cases, UEs apply the NR sidelink communications parameters provided in *SidelinkPreconfigNR* (if any). When UE performs state transition between above three cases, the UE applies the NR sidelink communications parameters provided in the new state, after acquisition of the new configurations. Before acquisition of the new configurations, UE continues applying the NR sidelink communications parameters provided in the old state.

5.8.9.1.2 Actions related to transmission of *RRCReconfigurationSidelink* message

The UE shall set the contents of RRCReconfigurationSidelink message as follows:

- 1> for each sidelink DRB that is to be released, according to clause 5.8.9.1a.1.1, due to configuration by *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* or by upper layers:
 - 2> set the entry included in the *slrb-ConfigToReleaseList* corresponding to the sidelink DRB;
- 1> for each sidelink DRB that is to be established or modified, according to clause 5.8.9.1a.2.1, due to receiving *sl-ConfigDedicatedNR*, *SIB12* or *SidelinkPreconfigNR*:
 - 2> if a sidelink DRB is to be established:
 - 3> assign a new logical channel identity for the logical channel to be associated with the sidelink DRB and set *sl-MAC-LogicalChannelConfigPC5* in the *SLRB-Config* to include the new logical channel identity;
 - 2> set the *SLRB-Config* included in the *slrb-ConfigToAddModList*, according to the received *sl-RadioBearerConfig* and *sl-RLC-BearerConfig* corresponding to the sidelink DRB;
- 1> set the *sl-MeasConfig* as follows:
 - 2> If the frequency used for NR sidelink communication is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-ConfigCommonNR* within SIB12:
 - 3> if UE is in RRC_CONNECTED:
 - 4> set the *sl-MeasConfig* according to stored NR sidelink measurement configuration information for this destination;
 - 3> if UE is in RRC_IDLE or RRC_INACTIVE:
 - 4> set the *sl-MeasConfig* according to stored NR sidelink measurement configuration received from *SIB12*;
 - 2> else:
 - 3> set the *sl-MeasConfig* according to the *sl-MeasPreconfig* in *SidelinkPreconfigNR*;
- 1> set the *sl-LatencyBoundIUC-Report*;
- 1> start timer T400 for the destination;
- 1> set the *sl-CSI-RS-Config*;
- 1> set the *sl-LatencyBoundCSI-Report*;
- 1> set the *sl-ResetConfig*;
- NOTE 1: Whether/how to set the parameters included in *sl-LatencyBoundIUC-Report*, *sl-CSI-RS-Config*, *sl-LatencyBoundCSI-Report* and *sl-ResetConfig* is up to UE implementation.
- 1> set the *sl-DRX-ConfigUC-PC5* as follows:

- 2> If the frequency used for NR sidelink communication is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-ConfigCommonNR* within *SIB12*:
 - 3> if UE is in RRC_CONNECTED and if *sl-ScheduledConfig* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:
 - 4> set the *sl-DRX-ConfigUC-PC5* according to stored NR sidelink DRX configuration information for this destination.
- NOTE 2: If UE is in RRC_IDLE or in RRC_INACTIVE or out of coverage, or in RRC_CONNECTED and *sl-UE-SelectedConfig* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*, it is up to UE implementation to set the *sl-DRX-ConfigUC-PC5*.
- 1> for each PC5 Relay RLC channel that is to be released due to configuration by sl-ConfigDedicatedNR:
 - 2> set the *SL-RLC-ChannelID* corresponding to the PC5 Relay RLC channel in the *sl-RLC-ChannelToReleaseListPC5*;
- 1> for each PC5 Relay RLC channel that is to be established or modified due to receiving sl-ConfigDedicatedNR:
 - 2> set the *SL-RLC-ChannelConfigPC5* included in the *sl-RLC-ChannelToAddModListPC5* according to the received *SL-RLC-ChannelConfig* corresponding to the PC5 Relay RLC channel, including setting *sl-RLC-ChannelID-PC5* to the same value of *sl-RLC-ChannelID* received in *SL-RLC-ChannelConfig*;

The UE shall submit the RRCReconfigurationSidelink message to lower layers for transmission.

5.8.9.1.3 Reception of an RRCReconfigurationSidelink by the UE

The UE shall perform the following actions upon reception of the RRCReconfigurationSidelink:

- 1> if the *RRCReconfigurationSidelink* includes the *sl-ResetConfig*:
 - 2> perform the sidelink reset configuration procedure as specified in 5.8.9.1.10;
- 1> if the RRCReconfigurationSidelink includes the slrb-ConfigToReleaseList:
 - 2> for each entry value included in the slrb-ConfigToReleaseList that is part of the current UE sidelink configuration;
 - 3> perform the sidelink DRB release procedure, according to clause 5.8.9.1a.1;
- 1> if the RRCReconfigurationSidelink includes the slrb-ConfigToAddModList:
 - 2> for each *slrb-PC5-ConfigIndex* value included in the *slrb-ConfigToAddModList* that is not part of the current UE sidelink configuration:
 - 3> if *sl-MappedQoS-FlowsToAddList* is included:
 - 4> apply the *SL-PQFI* included in *sl-MappedQoS-FlowsToAddList*;
 - 3> perform the sidelink DRB addition procedure, according to clause 5.8.9.1a.2;
 - 2> for each *slrb-PC5-ConfigIndex* value included in the *slrb-ConfigToAddModList* that is part of the current UE sidelink configuration:
 - 3> if *sl-MappedQoS-FlowsToAddList* is included:
 - 4> add the SL-PQFI included in sl-MappedQoS-FlowsToAddList to the corresponding sidelink DRB;
 - 3> if *sl-MappedQoS-FlowsToReleaseList* is included:
 - 4> remove the *SL-PQFI* included in *sl-MappedQoS-FlowsToReleaseList* from the corresponding sidelink DRB:
 - 3> if the sidelink DRB release conditions as described in clause 5.8.9.1a.1.1 are met:
 - 4> perform the sidelink DRB release procedure according to clause 5.8.9.1a.1.2;

- 3> else if the sidelink DRB modification conditions as described in clause 5.8.9.1a.2.1 are met:
 - 4> perform the sidelink DRB modification procedure according to clause 5.8.9.1a.2.2;
- 1> if the RRCReconfigurationSidelink message includes the sl-MeasConfig:
 - 2> perform the sidelink measurement configuration procedure as specified in 5.8.10;
- 1> if the RRCReconfigurationSidelink message includes the sl-CSI-RS-Config:
 - 2> apply the sidelink CSI-RS configuration;
- 1> if the RRCReconfigurationSidelink message includes the sl-LatencyBoundCSI-Report:
 - 2> apply the configured sidelink CSI report latency bound;
- 1> if the RRCReconfigurationSidelink includes the sl-RLC-ChannelToReleaseListPC5:
 - 2> for each *SL-RLC-ChannelID* value included in the *sl-RLC-ChannelToReleaseListPC5* that is part of the current UE sidelink configuration;
 - 3> perform the PC5 Relay RLC channel release procedure, according to clause 5.8.9.7.1;
- 1> if the RRCReconfigurationSidelink includes the sl-RLC-ChannelToAddModListPC5:
 - 2> for each *sl-RLC-ChannelID-PC5* value included in the *sl-RLC-ChannelToAddModListPC5* that is not part of the current UE sidelink configuration:
 - 3> perform the PC5 Relay RLC channel addition procedure, according to clause 5.8.9.7.2;
 - 2> for each *sl-RLC-ChannelID-PC5* value included in the *sl-RLC-ChannelToAddModListPC5* that is part of the current UE sidelink configuration:
 - 3> perform the PC5 Relay RLC channel modification procedure according to clause 5.8.9.7.2;
- 1> if the RRCReconfigurationSidelink message includes the sl-DRX-ConfigUC-PC5, and
- 1> if the UE accepts the *sl-DRX-ConfigUC-PC5*:
 - 2> configure lower layers to perform sidelink DRX operation according to *sl-DRX-ConfigUC-PC5* for the associated destination as defined in TS 38.321 [3];
- 1> if the RRCReconfigurationSidelink message includes the sl-LatencyBoundIUC-Report:
 - 2> apply the configured sidelink IUC report latency bound;
- 1> if the UE is unable to comply with (part of) the configuration included in the *RRCReconfigurationSidelink* (i.e. sidelink RRC reconfiguration failure):
 - 2> continue using the configuration used prior to the reception of the RRCReconfigurationSidelink message;
 - 2> set the content of the RRCReconfigurationFailureSidelink message;
 - 3> submit the RRCReconfigurationFailureSidelink message to lower layers for transmission;

- 2> set the content of the RRCReconfigurationCompleteSidelink message;
 - 3> if the UE rejects the sidelink DRX configuration sl-DRX-ConfigUC-PC5 received from the peer UE:
 - 4> include the *sl-DRX-ConfigReject* in the *RRCReconfigurationCompleteSidelink* message;
 - 4> consider no sidelink DRX to be applied for the corresponding sidelink unicast communication;
 - 3> submit the RRCReconfigurationCompleteSidelink message to lower layers for transmission;

- NOTE 1: When the same logical channel is configured with different RLC mode by another UE, the UE handles the case as sidelink RRC reconfiguration failure.
- NOTE 2: It is up to the UE whether or not to indicate the rejection to the peer UE for a received sidelink DRX configuration.

5.8.9.1.4	Void
5.8.9.1.5	Void
5.8.9.1.6	Void
5.8.9.1.7	Void

5.8.9.1.8 Reception of an RRCReconfigurationFailureSidelink by the UE

The UE shall perform the following actions upon reception of the RRCReconfigurationFailureSidelink:

- 1> stop timer T400 for the destination, if running;
- 1> continue using the configuration used prior to corresponding RRCReconfigurationSidelink message;
- 1> if UE is in RRC_CONNECTED:
 - 2> perform the sidelink UE information for NR sidelink communication procedure, as specified in 5.8.3.3 or clause 5.10.15 in TS 36.331 [10];

5.8.9.1.9 Reception of an RRCReconfigurationCompleteSidelink by the UE

The UE shall perform the following actions upon reception of the RRCReconfigurationCompleteSidelink:

- 1> stop timer T400 for the destination, if running;
- 1> consider the configurations in the corresponding RRCReconfigurationSidelink message to be applied.
 - 2> if the RRCReconfigurationCompleteSidelink message includes the sl-DRX-ConfigReject:
 - 3> consider no sidelink DRX to be applied for the corresponding sidelink unicast communication.

5.8.9.1.10 Sidelink reset configuration

The UE shall:

- 1> release/clear current sidelink radio configuration of this destination received in the RRCReconfigurationSidelink;
- 1> release the sidelink DRBs of this destination, in according to clause 5.8.9.1a.1;
- 1> reset the sidelink specific MAC of this destination.
- NOTE 1: Sidelink radio configuration is not just the resource configuration but may include other configurations included in the *RRCReconfigurationSidelink* message except the sidelink DRBs of this destination.
- NOTE 2: After the sidelink DRB release procedure, UE may perform the sidelink DRB addition according to the current sidelink configuration of this destination, received in *sl-ConfigDedicatedNR*, *SIB12* and *SidelinkPreconfigNR*, according to clause 5.8.9.1a.2.

5.8.9.1a Sidelink radio bearer management

5.8.9.1a.1 Sidelink DRB release

5.8.9.1a.1.1 Sidelink DRB release conditions

For NR sidelink communication, a sidelink DRB release is initiated in the following cases:

- 1> for groupcast, broadcast and unicast, if *slrb-Uu-ConfigIndex* (if any) of the sidelink DRB is included in *sl-RadioBearerToReleaseList* in *sl-ConfigDedicatedNR*; or
- 1> for groupcast and broadcast, if no sidelink QoS flow with data indicated by upper layers is mapped to the sidelink DRB for transmission, which is (re)configured by receiving SIB12 or SidelinkPreconfigNR; or
- 1> for groupcast, broadcast and unicast, if *SL-RLC-BearerConfigIndex* (if any) of the sidelink DRB is included in *sl-RLC-BearerToReleaseList* in *sl-ConfigDedicatedNR*; or
- 1> for unicast, if no sidelink QoS flow with data indicated by upper layers is mapped to the sidelink DRB for transmission, which is (re)configured by receiving SIB12 or SidelinkPreconfigNR, and if no sidelink QoS flow mapped to the sidelink DRB, which is (re)configured by receiving RRCReconfigurationSidelink, has data; or
- 1> for unicast, if *SLRB-PC5-ConfigIndex* (if any) of the sidelink DRB is included in *slrb-ConfigToReleaseList* in *RRCReconfigurationSidelink* or if *sl-ResetConfig* is included in *RRCReconfigurationSidelink*; or
- 1> for unicast, when the corresponding PC5-RRC connection is released due to sidelink RLF being detected, according to clause 5.8.9.3; or
- 1> for unicast, when the corresponding PC5-RRC connection is released due to upper layer request according to clause 5.8.9.5.

5.8.9.1a.1.2 Sidelink DRB release operations

For each sidelink DRB, whose sidelink DRB release conditions are met as in clause 5.8.9.1a.1.1, the UE capable of NR sidelink communication that is configured by upper layers to perform NR sidelink communication shall:

- 1> for groupcast and broadcast; or
- 1> for unicast, if the sidelink DRB release was triggered after the reception of the *RRCReconfigurationSidelink* message; or
- 1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the sidelink DRB release was triggered due to the configuration received within the *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* or indicated by upper layers:
 - 2> release the PDCP entity for NR sidelink communication associated with the sidelink DRB;
 - 2> if SDAP entity for NR sidelink communication associated with this sidelink DRB is configured:
 - 3> indicate the release of the sidelink DRB to the SDAP entity associated with this sidelink DRB (TS 37.324 [24], clause 5.3.3);
 - 2> release SDAP entities for NR sidelink communication, if any, that have no associated sidelink DRB as specified in TS 37.324 [24] clause 5.1.2;
- 1> for groupcast and broadcast; or
- 1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the sidelink DRB release was triggered due to the configuration received within the *sl-ConfigDedicatedNR*:
 - 2> for each *sl-RLC-BearerConfigIndex* included in the received *sl-RLC-BearerToReleaseList* that is part of the current UE sidelink configuration:
 - 3> release the RLC entity and the corresponding logical channel for NR sidelink communication, associated with the *sl-RLC-BearerConfigIndex*.

- 1> for unicast, if the sidelink DRB release was triggered due to the reception of the *RRCReconfigurationSidelink* message; or
- 1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the sidelink DRB release was triggered due to the configuration received within the *SIB12*, *SidelinkPreconfigNR* or indicated by upper layers:
 - 2> release the RLC entity and the corresponding logical channel for NR sidelink communication associated with the sidelink DRB;
 - 2> perform the sidelink UE information procedure in clause 5.8.3 for unicast if needed.
- 1> if the sidelink radio link failure is detected for a specific destination:
 - 2> release the PDCP entity, RLC entity and the logical channel of the sidelink DRB for the specific destination.

5.8.9.1a.2 Sidelink DRB addition/modification

5.8.9.1a.2.1 Sidelink DRB addition/modification conditions

For NR sidelink communication, a sidelink DRB addition is initiated only in the following cases:

- 1> if any sidelink QoS flow is (re)configured by *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* and is to be mapped to one sidelink DRB, which is not established; or
- 1> if any sidelink QoS flow is (re)configured by *RRCReconfigurationSidelink* and is to be mapped to a sidelink DRB, which is not established;

For NR sidelink communication, a sidelink DRB modification is initiated only in the following cases:

1> if any of the sidelink DRB related parameters is changed by *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* or *RRCReconfigurationSidelink* for one sidelink DRB, which is established;

5.8.9.1a.2.2 Sidelink DRB addition/modification operations

For the sidelink DRB, whose sidelink DRB addition conditions are met as in clause 5.8.9.1a.2.1, the UE capable of NR sidelink communication that is configured by upper layers to perform NR sidelink communication shall:

- 1> for groupcast and broadcast; or
- 1> for unicast, if the sidelink DRB addition was triggered due to the reception of the *RRCReconfigurationSidelink* message; or
- 1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the sidelink DRB addition was triggered due to the configuration received within the *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* or indicated by upper layers:
 - 2> if an SDAP entity for NR sidelink communication associated with the destination and the cast type of the sidelink DRB does not exist:
 - 3> establish an SDAP entity for NR sidelink communication as specified in TS 37.324 [24] clause 5.1.1;
 - 2> (re)configure the SDAP entity in accordance with the *sl-SDAP-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-SDAP-Config* received in *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR*, associated with the sidelink DRB;
 - 2> establish a PDCP entity for NR sidelink communication and configure it in accordance with the *sl-PDCP-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-PDCP-Config* received in *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR*, associated with the sidelink DRB;
 - 2> establish a RLC entity for NR sidelink communication and configure it in accordance with the *sl-RLC-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-RLC-Config* received in *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR*, associated with sidelink DRB;
 - 2> if this procedure was due to the reception of a RRCReconfigurationSidelink message:

- 3> configure the MAC entity with a logical channel in accordance with the *sl-MAC-LogicalChannelConfigPC5* received in the *RRCReconfigurationSidelink* associated with the sidelink DRB, and perform the sidelink UE information procedure in clause 5.8.3 for unicast if need;
- 2> else if this procedure was due to the reception of a RRCReconfigurationCompleteSidelink message:
 - 3> configure the MAC entity with a logical channel associated with the sidelink DRB, in accordance with the *sl-MAC-LogicalChannelConfig* received in the *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR*;
- 2> else (i.e. for groupcast/broadcast):
 - 3> configure the MAC entity with a logical channel associated with the sidelink DRB, in accordance with the sl-MAC-LogicalChannelConfig received in the sl-ConfigDedicatedNR, SIB12, SidelinkPreconfigNR and assign a new LCID to this logical channel.
- NOTE 1: When a sidelink DRB addition is due to the configuration by *RRCReconfigurationSidelink*, it is up to UE implementation to select the sidelink DRB configuration as necessary transmitting parameters for the sidelink DRB, from the received *sl-ConfigDedicatedNR* (if in RRC_CONNECTED), *SIB12* (if in RRC_IDLE/INACTIVE), *SidelinkPreconfigNR* (if out of coverage) with the same RLC mode as the one configured in *RRCReconfigurationSidelink*.

For the sidelink DRB, whose sidelink DRB modification conditions are met as in clause 5.8.9.1a.2.1, the UE capable of NR sidelink communication that is configured by upper layers to perform NR sidelink communication shall:

- 1> for groupcast and broadcast; or
- 1> for unicast, if the sidelink DRB modification was triggered due to the reception of the *RRCReconfigurationSidelink* message; or
- 1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the sidelink DRB modification was triggered due to the configuration received within the *sl-ConfigDedicatedNR*, *SIB12* or *SidelinkPreconfigNR*:
 - 2> reconfigure the SDAP entity of the sidelink DRB, in accordance with the *sl-SDAP-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-SDAP-Config* received in *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR*, if included;
 - 2> reconfigure the PDCP entity of the sidelink DRB, in accordance with the *sl-PDCP-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-PDCP-Config* received in *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR*, if included;
 - 2> reconfigure the RLC entity of the sidelink DRB, in accordance with the *sl-RLC-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-RLC-Config* received in *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR*, if included;
 - 2> reconfigure the logical channel of the sidelink DRB, in accordance with the *sl-MAC-LogicalChannelConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-MAC-LogicalChannelConfig* received in *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR*, if included.

5.8.9.1a.3 Sidelink SRB release

The UE shall:

- 1> if a PC5-RRC connection release for a specific destination is requested by upper layers or AS layer; or
- 1> if the sidelink radio link failure is detected for a specific destination:
 - 2> release the PDCP entity, RLC entity and the logical channel of the sidelink SRB for PC5-RRC message of the specific destination;
 - 2> consider the PC5-RRC connection is released for the destination.
- 1> if PC5-S transmission for a specific destination is terminated in upper layers:
 - 2> release the PDCP entity, RLC entity and the logical channel of the sidelink SRB(s) for PC5-S message of the specific destination;

- 1> if discovery transmission for a specific destination is terminated in upper layers:
 - 2> release the PDCP entity, RLC entity and the logical channel of the sidelink SRB4 for discovery message of the specific destination;

5.8.9.1a.4 Sidelink SRB addition

The UE shall:

- 1> if transmission of PC5-S message for a specific destination is requested by upper layers for sidelink SRB:
 - 2> establish PDCP entity, RLC entity and the logical channel of a sidelink SRB for PC5-S message, as specified in clause 9.1.1.4;
- 1> if transmission of discovery message for a specific destination is requested by upper layers for sidelink SRB:
 - 2> establish PDCP entity, RLC entity and the logical channel of a sidelink SRB4 for discovery message, as specified in clause 9.1.1.4;
- 1> if a PC5-RRC connection establishment for a specific destination is indicated by upper layers:
 - 2> establish PDCP entity, RLC entity and the logical channel of a sidelink SRB for PC5-RRC message of the specific destination, as specified in clause 9.1.1.4;
 - 2> consider the PC5-RRC connection is established for the destination.

5.8.9.2 Sidelink UE capability transfer

5.8.9.2.1 General

This clause describes how the UE compiles and transfers its sidelink UE capability information for unicast to the initiating UE.

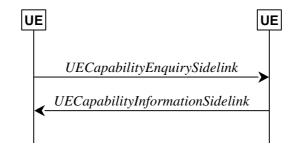


Figure 5.8.9.2.1-1: Sidelink UE capability transfer

5.8.9.2.2 Initiation

The UE may initiate the sidelink UE capability transfer procedure upon indication from upper layer when it needs (additional) UE radio access capability information.

5.8.9.2.3 Actions related to transmission of the *UECapabilityEnquirySidelink* by the UE

The initiating UE shall set the contents of *UECapabilityEnquirySidelink* message as follows:

- 1> include in UE radio access capabilities for sidelink within ue-CapabilityInformationSidelink, if needed;
- NOTE 1: It is up to initiating UE to decide whether ue-CapabilityInformationSidelink should be included.
- 1> set *frequencyBandListFilterSidelink* to include frequency bands for which the peer UE is requested to provide supported bands and band combinations;
- NOTE 2: The initiating UE is not allowed to send the *UECapabilityEnquirySidelink* message without including the field *frequencyBandListFilterSidelink*.

1> submit the UECapabilityEnquirySidelink message to lower layers for transmission.

5.8.9.2.4 Actions related to reception of the UECapabilityEnquirySidelink by the UE

The peer UE shall set the contents of UECapabilityInformationSidelink message as follows:

- 1> include UE radio access capabilities for sidelink within ue-CapabilityInformationSidelink;
- 1> compile a list of "candidate band combinations" only consisting of bands included in *frequencyBandListFilterSidelink*, and prioritized in the order of *frequencyBandListFilterSidelink* (i.e. first include band combinations containing the first-listed band, then include remaining band combinations containing the second-listed band, and so on).
- 1> include into *supportedBandCombinationListSidelinkNR* as many band combinations as possible from the list of "candidate band combinations", starting from the first entry;
- 1> include the received *frequencyBandListFilterSidelink* in the field *appliedFreqBandListFilter* of the requested UE capability;
- 1> submit the UECapabilityInformationSidelink message to lower layers for transmission.

NOTE: If the UE cannot include all band combinations due to message size or list size constraints, it is up to UE implementation which band combinations it prioritizes.

5.8.9.3 Sidelink radio link failure related actions

The UE shall:

- 1> upon indication from sidelink RLC entity that the maximum number of retransmissions for a specific destination has been reached; or
- 1> upon T400 expiry for a specific destination; or
- 1> upon indication from MAC entity that the maximum number of consecutive HARQ DTX for a specific destination has been reached; or
- 1> upon integrity check failure indication from sidelink PDCP entity concerning SL-SRB2 or SL-SRB3 for a specific destination:
 - 2> consider sidelink radio link failure to be detected for this destination;
 - 2> release the DRBs of this destination, according to clause 5.8.9.1a.1;
 - 2> release the SRBs of this destination, according to clause 5.8.9.1a.3;
 - 2> release the PC5 Relay RLC channels of this destination if configured, in according to clause 5.8.9.7.1;
 - 2> discard the NR sidelink communication related configuration of this destination;
 - 2> reset the sidelink specific MAC of this destination;
 - 2> consider the PC5-RRC connection is released for the destination;
 - 2> indicate the release of the PC5-RRC connection to the upper layers for this destination (i.e. PC5 is unavailable);
 - 2> if UE is in RRC_CONNECTED:
 - 3> if the UE is acting as L2 U2N Remote UE for the destination:
 - 4> initiate the RRC connection re-establishment procedure as specified in 5.3.7.
 - 3> else:
 - 4> perform the sidelink UE information for NR sidelink communication procedure, as specified in 5.8.3.3:

NOTE: It is up to UE implementation on whether and how to indicate to upper layers to maintain the keep-alive procedure [55].

5.8.9.4 Sidelink common control information

5.8.9.4.1 General

The sidelink common control information is carried by *MasterInformationBlockSidelink*. The sidelink common control information may change at any transmission, i.e. neither a modification period nor a change notification mechanism is used. This procedure also applies to NR sidelink discovery.

A UE configured to receive or transmit NR sidelink communication/discovery shall:

- 1> if the UE has a selected SyncRef UE, as specified in 5.8.6:
 - 2> ensure having a valid version of the MasterInformationBlockSidelink message of that SyncRef UE;

5.8.9.4.2 Actions related to reception of *MasterInformationBlockSidelink* message

Upon receiving MasterInformationBlockSidelink, the UE shall:

1> apply the values included in the received *MasterInformationBlockSidelink* message.

5.8.9.4.3 Transmission of *MasterInformationBlockSidelink* message

The UE shall set the contents of the MasterInformationBlockSidelink message as follows:

- 1> if in coverage on the frequency used for the NR sidelink communication as defined in TS 38.304 [20].
 - 2> set inCoverage to true;
 - 2> if tdd-UL-DL-ConfigurationCommon is included in the received SIB1:
 - 3> set *sl-TDD-Config* to the value representing the same meaning as that is included in *tdd-UL-DL-ConfigurationCommon*, as described in TS 38.213, clause 16.1 [13];
 - 2> else:
 - 3> set sl-TDD-Config to the value as specified in TS 38.213 [13], clause 16.1;
 - 2> if *syncInfoReserved* is included in an entry of configured *sl-SyncConfigList* corresponding to the concerned frequency from the received *SIB12*:
 - 3> set reservedBits to the value of syncInfoReserved in the received SIB12;
 - 2> else:
 - 3> set all bits in reservedBits to 0;
- 1> else if out of coverage on the frequency used for NR sidelink communication as defined in TS 38.304 [20]; and the concerned frequency is included in *sl-FreqInfoToAddModList* in *RRCReconfiguration* or in *sl-FreqInfoList* within *SIB12*:
 - 2> set inCoverage to true;
 - 2> set *reservedBits* to the value of the corresponding field included in the preconfigured sidelink parameters (i.e. *sl-PreconfigGeneral* in *SidelinkPreconfigNR* defined in 9.3);
 - 2> set *sl-TDD-Config* to the value representing the same meaning as that is included in the corresponding field included in the preconfigured sidelink parameters (i.e. *sl-PreconfigGeneral* in *SL-PreconfigurationNR* defined in 9.3) as described in TS 38.213, clause 16.1 [13];
- 1> else if out of coverage on the frequency used for NR sidelink communication as defined in TS 38.304 [20]; and the UE selects GNSS as the synchronization reference and *sl-SSB-TimeAllocation3* is not configured for the frequency used in *SidelinkPreconfigNR*:

- 2> set inCoverage to true;
- 2> set *reservedBits* to the value of the corresponding field included in the preconfigured sidelink parameters (i.e. *sl-PreconfigGeneral* in *SidelinkPreconfigNR* defined in 9.3);
- 2> set *sl-TDD-Config* to the value representing the same meaning as that is included in the corresponding field included in the preconfigured sidelink parameters (i.e. *sl-PreconfigGeneral* in *SL-PreconfigurationNR* defined in 9.3) as described in TS 38.213, clause 16.1 [13];
- 1> else if the UE has a selected SyncRef UE (as defined in 5.8.6):
 - 2> set inCoverage to false;
 - 2> set *sl-TDD-Config* and *reservedBits* to the value of the corresponding field included in the received *MasterInformationBlockSidelink*;

- 2> set *inCoverage* to *false*;
- 2> set *reservedBits* to the value of the corresponding field included in the preconfigured sidelink parameters (i.e. *sl-PreconfigGeneral* in *SidelinkPreconfigNR* defined in 9.3);
- 2> set *sl-TDD-Config* to the value representing the same meaning as that is included in the corresponding field included in the preconfigured sidelink parameters (i.e. *sl-PreconfigGeneral* in *SL-PreconfigurationNR* defined in 9.3) as described in TS 38.213, clause 16.1 [13];
- 1> set directFrameNumber and slotIndex according to the slot used to transmit the SLSS, as specified in 5.8.5.3;
- 1> submit the MasterInformationBlockSidelink to lower layers for transmission upon which the procedure ends;

5.8.9.5 Actions related to PC5-RRC connection release requested by upper layers

The UE initiates the procedure when upper layers request the release of the PC5-RRC connection as specified in TS 24.587 [57] or TS 24.554 [72]. The UE shall not initiate the procedure for power saving purposes.

The UE shall:

- 1> if the PC5-RRC connection release for the specific destination is requested by upper layers:
 - 2> discard the NR sidelink communication related configuration of this destination;
 - 2> release the DRBs of this destination if configured, in according to clause 5.8.9.1a.1;
 - 2> release the SRBs of this destination, in according to clause 5.8.9.1a.3;
 - 2> release the PC5 Relay RLC channels if configured, in according to clause 5.8.9.7.1;
 - 2> reset the sidelink specific MAC of this destination.
 - 2> consider the PC5-RRC connection is released for the destination;

5.8.9.6 Sidelink UE assistance information

5.8.9.6.1 General



Figure 5.8.9.6.1-1: Sidelink UE assistance information

The purpose of this procedure is for a UE to inform its peer UE of the sidelink DRX assistance information used to determine the sidelink DRX configuration for unicast communication.

For sidelink unicast, a UE may include its desired sidelink DRX configurations in the *UEAssistanceInformationSidelink* as the sidelink DRX assistance information which is transmitted to its peer UE.

NOTE: It is up to UE implementation to determine its desired sidelink DRX configurations for unicast communication.

5.8.9.6.2 Initiation

For sidelink unicast, if both a RX UE and its peer TX UE for a direction of sidelink communication are capable of sidelink DRX, the RX UE that is interested in sending the sidelink DRX assistance information may send the *UEAssistanceInformationSidelink* as the sidelink DRX assistance information to its peer UE when the sidelink DRX assistance information has not been sent previously or when the previously transmitted sidelink DRX assistance information has changed.

5.8.9.6.3 Actions related to reception of *UEAssistanceInformationSidelink* message

For sidelink unicast, when a UE is in RRC_CONNECTED and is performing sidelink operation with resource allocation mode 1, it may report the sidelink DRX assistance information received within the *UEAssistanceInformationSidelink* from its peer UE to the network as specified in 5.8.3. For sidelink unicast, when a UE is in RRC_CONNECTED and is performing sidelink operation with resource allocation mode 2 or is in RRC_IDLE or RRC_INACTIVE or out of coverage, regardless of whether the UE has obtained the sidelink DRX assistance information from the *UEAssistanceInformationSidelink* transmitted from its peer UE or not, it may determine the sidelink DRX configuration *SL-DRX-ConfigUC* for its peer UE.

NOTE: When UE determines the sidelink DRX configuration for its peer UE, it may take the sidelink DRX assistance information received from its peer UE into account.

5.8.9.7 PC5 Relay RLC channel management for L2 U2N relay

5.8.9.7.1 PC5 Relay RLC channel release

The UE shall:

- 1> if the PC5 Relay RLC channel release was triggered after the reception of the *RRCReconfigurationSidelink* message; or
- 1> after receiving the *RRCReconfigurationCompleteSidelink* message, if the PC5 Relay RLC channel release was triggered due to the configuration received within the *sl-ConfigDedicatedNR*:
 - 2> for each *sl-RLC-ChannelID* in *sl-RLC-ChannelToReleaseList* received in *sl-ConfigDedicatedNR* within *RRCReconfiguration* or for each *sl-RLC-ChannelID-PC5* included in the received *sl-RLC-ChannelToReleaseListPC5* that is part of the current UE sidelink configuration:

- 3> release the RLC entity and the corresponding logical channel associated with the *sl-RLC-ChannelID* or *sl-RLC-ChannelID-PC5*;
- 1> if the PC5 Relay RLC channel release was triggered for a specific destination by upper layers as specified in 5.8.9.5:
 - 2> release the RLC entity and the corresponding logical channel associated with the *sl-RLC-ChannelID* or *sl-RLC-ChannelID-PC5* of the specific destination;

5.8.9.7.2 PC5 Relay RLC channel addition/modification

Upon PC5-RRC connection establishment between the L2 U2N Relay UE and L2 U2N Remote UE, the L2 U2N Relay UE shall:

- 1> establish a SRAP entity as specified in TS 38.351 [66], if no SRAP entity has been established;
- 1> apply RLC specified configuration of SL-RLC0 as specified in clause 9.1.1.4:
- 1> apply RLC default configuration of SL-RLC1 as defined in clause 9.2.4 if the L2 U2N Relay UE is in RRC IDLE/INACTIVE state;

The UE shall:

- 1> if the PC5 Relay RLC channel addition/modification was triggered due to the reception of the RRCReconfigurationSidelink message; or
- 1> after receiving the *RRCReconfigurationCompleteSidelink* message, if the PC5 Relay RLC channel addition/modification was triggered due to the configuration received within the *sl-ConfigDedicatedNR*:
 - 2> if the current configuration contains a PC5 Relay RLC channel with the received *sl-RLC-ChannelID* or *sl-RLC-ChannelID-PC5*:
 - 3> reconfigure the sidelink RLC entity in accordance with the received *sl-RLC-Config* or *sl-RLC-ConfigPC5*;
 - 3> reconfigure the sidelink MAC entity with a logical channel in accordance with the received *sl-MAC-LogicalChannelConfig* or *sl-MAC-LogicalChannelConfigPC5*;
 - 2> else (a PC5 Relay RLC channel with the received *sl-RLC-ChannelID* or *sl-RLC-ChannelID-PC5* was not configured before):
 - 3> establish a sidelink RLC entity in accordance with the received sl-RLC-Config or sl-RLC-ConfigPC5;
 - 3> configure the sidelink MAC entity with a logical channel in accordance with the received *sl-MAC-LogicalChannelConfig* or *sl-MAC-LogicalChannelConfigPC5*.

5.8.9.8 Remote UE information

5.8.9.8.1 General



Figure 5.8.9.8.1-1: Remote UE information

This procedure is used by the L2 U2N Remote UE in RRC_IDLE/RRC_INACTIVE to inform about the required SIB(s) and provide Paging related information to the connected L2 U2N Relay UE.

NOTE: MIB is not required by a L2 U2N Remote UE.

5.8.9.8.2 Actions related to transmission of *RemoteUEInformationSidelink* message

When entering RRC_IDLE or RRC_INACTIVE, or upon change in any of the information in the *RemoteUEInformationSidelink* while in RRC_IDLE or RRC_INACTIVE, the L2 U2N Remote UE shall:

- 1> if the UE has not stored a valid version of a SIB, in accordance with clause 5.2.2.2.1, of one or several required SIB(s) in accordance with clause 5.2.2.1 and the requested SIB has not been indicated in *RemoteUEInformationSidelink* message to the L2 U2N Relay UE before:
 - 2> include sl-RequestedSIB-List in the RemoteUEInformationSidelink to indicate the requested SIB(s);
- 1> if the UE has not sent *sl-PagingInfo-RemoteUE* in the *RemoteUEInformationSidelink* message to the L2 U2N Relay UE before, set *sl-PagingInfo-RemoteUE* as follows:
 - 2> if the L2 U2N Remote UE is in RRC IDLE:
 - 3> include ng-5G-S-TMSI in the sl-PagingIdentityRemoteUE;
 - 3> if the UE specific DRX cycle is configured by upper layer, set *sl-PagingCycleRemoteUE* to the value of UE specific Uu DRX cycle configured by upper layer;
 - 2> else if the L2 U2N Remote UE is in RRC_INACTIVE:
 - 3> include ng-5G-S-TMSI and fullI-RNTI in the sl-PagingIdentityRemoteUE;
 - 3> if the UE specific DRX cycle is configured by upper layer,
 - 4> set *sl-PagingCycleRemoteUE* to the minimum value of UE specific Uu DRX cycles (configured by upper layer and configured by RRC);
 - 3> else:
 - 4> set sl-PagingCycleRemoteUE to the value of UE specific DRX cycle configured by RRC;
- 1> submit the *RemoteUEInformationSidelink* message to lower layers for transmission;

When entering RRC_CONNECTED, if L2 U2N remote UE had sent *sl-RequestedSIB-List* and/or *sl-PagingInfo-RemoteUE*, the L2 U2N Remote UE shall:

- 1> set the *sl-RequestedSIB-List* to the value *release* if requested before;
- 1> set the *sl-PagingInfo-RemoteUE* to the value *release* if sent before;
- 1> submit the RemoteUEInformationSidelink message to lower layers for transmission;

5.8.9.8.3 Reception of RemoteUEInformationSidelink message by the L2 U2N Relay UE

The L2 U2N Relay UE shall:

- 1> if the *RemoteUEInformationSidelink* includes the *sl-PagingInfo-RemoteUE*:
 - 2> if the UE is in RRC_CONNECTED on an active BWP with common search space configured including pagingSearchSpace; or
 - 2> if the UE is in RRC_IDLE or RRC_INACTIVE:
 - 3> if the *sl-PagingInfo-RemoteUE* is set to *setup*:
 - 4> monitor the *Paging* message at the L2 U2N Remote UE's paging occasion calculated according to *sl-PagingIdentityRemoteUE* and *sl-PagingCycleRemoteUE* included in *sl-PagingInfo-RemoteUE*;
 - 3> else (the *sl-PagingInfo-RemoteUE* is set to *release*):
 - 4> stop monitoring the *Paging* message at the L2 U2N Remote UE's paging occasion;
 - 4> release the received paging information in *sl-PagingInfo-RemoteUE*;

- 2> else (the UE is in RRC_CONNECTED on an active BWP without pagingSearchSpace configured):
 - 3> if the *sl-PagingInfo-RemoteUE* is set to *setup*:
 - 4> include the received *sl-PagingIdentityRemoteUE* in *SidelinkUEInformationNR* message and perform Sidelink UE information transmission in accordance with 5.8.3;
 - 3> else (the *sl-PagingInfo-RemoteUE* is set to *release*):
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to release the *sl-PagingIdentityRemoteUE* in *SidelinkUEInformationNR* message in accordance with 5.8.3;
 - 4> release the received paging information in *sl-PagingInfo-RemoteUE*;
- 1> if the *RemoteUEInformationSidelink* includes the *sl-RequestedSIB-List*:
 - 2> if the *sl-RequestedSIB-List* is set to *setup*:
 - 3> if the L2 U2N Relay UE has not stored a valid version of SIB(s) indicated in sl-RequestedSIB-List:
 - 4> perform acquisition of the system information indicated in *sl-RequestedSIB-List* in accordance with 5.2.2:
 - 3> else:
 - 4> perform the Uu message transfer procedure in accordance with 5.8.9.9;
 - 2> if the *sl-RequestedSIB-List* is set to *release*:
 - 3> release received SIB request in sl-RequestedSIB-List.

5.8.9.9 Uu message transfer in sidelink

5.8.9.9.1 General



Figure 5.8.9.9.1-1: Uu message transfer in sidelink

The purpose of this procedure is to transfer *Paging* message and System Information from the L2 U2N Relay UE to the L2 U2N Remote UE in RRC_IDLE/RRC_INACTIVE.

5.8.9.9.2 Actions related to transmission of *UuMessageTransferSidelink* message

The L2 U2N Relay UE initiates the Uu message transfer procedure when at least one of the following conditions is met:

- 1> upon receiving *Paging* message related to the connected L2 U2N Remote UE from network (including *Paging* message within *RRCReconfiguration* message);
- 1> upon acquisition of the SIB(s) requested by the connected L2 U2N Remote UE (as indicated in *sl-RequestedSIB-List* in the *RemoteUEInformationSidelink*) or upon receiving the updated SIB(s) from network which has been requested by the connected L2 U2N Remote UE;
- 1> upon unsolicited SIB1 forwarding to the connected L2 U2N Remote UE or upon receiving the updated SIB1 from network;

For each associated L2 U2N Remote UE, the L2 U2N Relay UE shall set the contents of *UuMessageTransferSidelink* message as follows:

- 1> include *sl-PagingDelivery* if the *Paging* message received from network containing the *ue-Identity* of the L2 U2N Remote UE;
- 1> include *sl-SIB1-Delivery* if any of the conditions for initiating Uu message transfer procedure related to SIB1 are met:
- 1> include *sl-SystemInformationDelivery* if any of the conditions for initiating Uu message transfer procedure related to System Information are met;
- 1> submit the *UuMessageTransferSidelink* message to lower layers for transmission.

NOTE: The L2 U2N Relay UE may perform unsolicited forwarding of SIB1 to the L2 U2N Remote UE based on UE implementation.

5.8.9.9.3 Reception of the *UuMessageTransferSidelink*

Upon receiving the *UuMessageTransferSidelink* message, the L2 U2N Remote UE shall:

- 1> if *sl-PagingDelivery* is included:
 - 2> perform the paging reception procedure as specified in clause 5.3.2.3;
- 1> if *sl-SystemInformationDelivery* and/or *sl-SIB1-Delivery* is included:
 - 2> perform the actions specified in clause 5.2.2.4.

5.8.9.10 Notification Message

5.8.9.10.1 General



Figure 5.8.9.8.1-1: Notification message in sidelink

This procedure is used by a U2N Relay UE to send notification to the connected U2N Remote UE.

5.8.9.10.2 Initiation

The U2N Relay UE may initiate the procedure when one of the following conditions is met:

- 1> upon Uu RLF as specified in 5.3.10;
- 1> upon reception of an RRCReconfiguration including the reconfigurationWithSync;
- 1> upon cell reselection;
- 1> upon L2 U2N Relay UE's RRC connection failure including RRC connection reject as specified in 5.3.3.5 and 5.3.13.10, and T300 expiry as specified in 5.3.3.7, and RRC resume failure as specified in 5.3.13.5;

5.8.9.10.3 Actions related to transmission of *NotificationMessageSidelink* message

The U2N Relay UE shall set the indication type as follows:

- 1> if the UE initiates transmission of the NotificationMessageSidelink message due to Uu RLF:
- 2> set the *indicationType* as *relayUE-Uu-RLF*;

- 1> else if the UE initiates transmission of the *NotificationMessageSidelink* message due to reconfiguration with sync:
 - 2> set the *indicationType* as *relayUE-HO*;
- 1> else if the UE initiates transmission of the NotificationMessageSidelink message due to cell reselection:
 - 2> set the *indicationType* as *relayUE-CellReselection*;
- 1> if the UE initiates transmission of the *NotificationMessageSidelink* message due to Uu RRC connection establishment/Resume failure:
 - 2> set the *indicationType* as *relayUE-Uu-RRC-Failure*;
 - 1> submit the *NotificationMessageSidelink* message to lower layers for transmission.

5.8.9.10.4 Actions related to reception of *NotificationMessageSidelink* message

Upon receiving the *NotificationMessageSidelink*, the U2N Remote UE shall:

- 1> if the *indicationType* is included:
 - 2> if the UE is L2 U2N Remote UE in RRC_CONNECTED:
 - 3> if T301 is not running, initiate the RRC connection re-establishment procedure as specified in 5.3.7;
 - 2> else (the UE is L3 U2N Remote UE, or L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE):
 - 3> if the PC5-RRC connection with the U2N Relay UE is determined to be released:
 - 4> indicate upper layers to trigger PC5 unicast link release;
 - 3> else (i.e., maintain the PC5 RRC connection):
 - 4> if the UE is L2 U2N Remote UE and the *indicationType* is *relayUE-HO or relayUE-CellReselection*:
 - 5> consider cell re-selection occurs;
- NOTE 1: For L3 U2N Remote UE, or L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE, it is up to Remote UE implementation whether to release or keep the PC5 unicast link.
- NOTE 2: The L2 U2N Remote UE may ignore the *NotificationMessageSidelink* if it does not release the PC5 unicast link in source side yet during an indirect-to-direct path switch, i.e. T304 is running.

5.8.10 Sidelink measurement

5.8.10.1 Introduction

The UE may configure the associated peer UE to perform NR sidelink measurement and report on the corresponding PC5-RRC connection in accordance with the NR sidelink measurement configuration for unicast by *RRCReconfigurationSidelink* message.

The NR sidelink measurement configuration includes the following parameters for a PC5-RRC connection:

- 1. NR sidelink measurement objects: Object(s) on which the associated peer UE shall perform the NR sidelink measurements.
 - For NR sidelink measurement, a NR sidelink measurement object indicates the NR sidelink frequency of reference signals to be measured.
- **2. NR sidelink reporting configurations:** NR sidelink measurement reporting configuration(s) where there can be one or multiple NR sidelink reporting configurations per NR sidelink measurement object. Each NR sidelink reporting configuration consists of the following:

- Reporting criterion: The criterion that triggers the UE to send a NR sidelink measurement report. This can either be periodical or a single event description.
- RS type: The RS that the UE uses for NR sidelink measurement results. In this release, only DMRS is supported for NR sidelink measurement.
- Reporting format: The quantities that the UE includes in the measurement report. In this release, only RSRP measurement is supported.
- 3. NR sidelink measurement identities: A list of NR sidelink measurement identities where each NR sidelink measurement identity links one NR sidelink measurement object with one NR sidelink reporting configuration. By configuring multiple NR sidelink measurement identities, it is possible to link more than one NR sidelink measurement object to the same NR sidelink reporting configuration, as well as to link more than one NR sidelink reporting configuration to the same NR sidelink measurement object. The NR sidelink measurement identity is also included in the NR sidelink measurement report that triggered the reporting, serving as a reference to the network.
- **4. NR sidelink quantity configurations:** The NR sidelink quantity configuration defines the NR sidelink measurement filtering configuration used for all event evaluation and related reporting, and for periodical reporting of that NR sidelink measurement. In each configuration, different filter coefficients can be configured for different NR sidelink measurement quantities.

Both UEs of the PC5-RRC connection maintains a NR sidelink measurement object list, a NR sidelink reporting configuration list, and a NR sidelink measurement identities list according to signalling and procedures in this specification.

5.8.10.2 Sidelink measurement configuration

5.8.10.2.1 General

The UE shall:

- 1> if the received sl-MeasConfig includes the sl-MeasObjectToRemoveList in the RRCReconfigurationSidelink:
 - 2> perform the sidelink measurement object removal procedure as specified in 5.8.10.2.4;
- 1> if the received *sl-MeasConfig* includes the *sl-MeasObjectToAddModList* in the *RRCReconfigurationSidelink*:
 - 2> perform the sidelink measurement object addition/modification procedure as specified in 5.8.10.2.5;
- 1> if the received sl-MeasConfig includes the sl-ReportConfigToRemoveList in the RRCReconfigurationSidelink:
 - 2> perform the sidelink reporting configuration removal procedure as specified in 5.8.10.2.6;
- 1> if the received *sl-MeasConfig* includes the *sl-ReportConfigToAddModList* in the *RRCReconfigurationSidelink*:
 - 2> perform the sidelink reporting configuration addition/modification procedure as specified in 5.8.10.2.7;
- 1> if the received sl-MeasConfig includes the sl-QuantityConfig in the RRCReconfigurationSidelink:
 - 2> perform the sidelink quantity configuration procedure as specified in 5.8.10.2.8;
- 1> if the received sl-MeasConfig includes the sl-MeasIdToRemoveList in the RRCReconfigurationSidelink:
 - 2> perform the sidelink measurement identity removal procedure as specified in 5.8.10.2.2;
- 1> if the received sl-MeasConfig includes the sl-MeasIdToAddModList in the RRCReconfigurationSidelink:
 - 2> perform the sidelink measurement identity addition/modification procedure as specified in 5.8.10.2.3;

5.8.10.2.2 Sidelink measurement identity removal

- 1> for each *sl-MeasId* included in the received *sl-MeasIdToRemoveList* that is part of the current UE configuration in *VarMeasConfigSL*:
 - 2> remove the entry with the matching sl-MeasId from the sl-MeasIdList within the VarMeasConfigSL;
 - 2> remove the NR sidelink measurement reporting entry for this *sl-MeasId* from the *VarMeasReportListSL*, if included:
 - 2> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*.
- NOTE: The UE does not consider the message as erroneous if the *sl-MeasIdToRemoveList* includes any *sl-MeasId* value that is not part of the current UE configuration.

5.8.10.2.3 Sidelink measurement identity addition/modification

The UE shall:

- 1> for each sl-MeasId included in the received sl-MeasIdToAddModList:
 - 2> if an entry with the matching sl-MeasId exists in the sl-MeasIdList within the VarMeasConfigSL:
 - 3> replace the entry with the value received for this *sl-MeasId*;
 - 2> else:
 - 3> add a new entry for this *sl-MeasId* within the *VarMeasConfigSL*;
 - 2> remove the measurement reporting entry for this sl-MeasId from the VarMeasReportListSL, if included;
 - 2> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*;

5.8.10.2.4 Sidelink measurement object removal

The UE shall:

- 1> for each sl-MeasObjectId included in the received sl-MeasObjectToRemoveList that is part of sl-MeasObjectList in VarMeasConfigSL:
 - 2> remove the entry with the matching *sl-MeasObjectId* from the *sl-MeasObjectList* within the *VarMeasConfigSL*;
 - 2> remove all *sl-MeasId* associated with this *sl-MeasObjectId* from the *sl-MeasIdList* within the *VarMeasConfigSL*, if any;
 - 2> if a *sl-MeasId* is removed from the *sl-MeasIdList*:
 - 3> remove the measurement reporting entry for this sl-MeasId from the VarMeasReportListSL, if included;
 - 3> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*.
- NOTE: The UE does not consider the message as erroneous if the *sl-MeasObjectToRemoveList* includes any *sl-MeasObjectId* value that is not part of the current UE configuration.

5.8.10.2.5 Sidelink measurement object addition/modification

- 1> for each sl-MeasObjectId included in the received sl-MeasObjectToAddModList:
 - 2> if an entry with the matching *sl-MeasObjectId* exists in the *sl-MeasObjectList* within the *VarMeasConfigSL*, for this entry:

- 3> for each *sl-MeasId* associated with this *sl-MeasObjectId* included in the *sl-MeasIdList* within the *VarMeasConfigSL*, if any:
 - 4> remove the measurement reporting entry for this *sl-MeasId* from the *VarMeasReportListSL*, if included;
 - 4> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*;
- 3> reconfigure the entry with the value received for this *sl-MeasObject*;
- 2> else:
 - 3> add a new entry for the received sl-MeasObject to the sl-MeasObjectList within VarMeasConfigSL.

5.8.10.2.6 Sidelink reporting configuration removal

The UE shall:

- 1> for each *sl-ReportConfigId* included in the received *sl-ReportConfigToRemoveList* that is part of the current UE configuration in *VarMeasConfigSL*:
 - 2> remove the entry with the matching *sl-ReportConfigId* from the *sl-ReportConfigList* within the *VarMeasConfigSL*;
 - 2> remove all *sl-MeasId* associated with the *sl-ReportConfigId* from the *sl-MeasIdList* within the *VarMeasConfigSL*, if any;
 - 2> if a *sl-MeasId* is removed from the *sl-MeasIdList*:
 - 3> remove the measurement reporting entry for this sl-MeasId from the VarMeasReportListSL, if included;
 - 3> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*.

NOTE: The UE does not consider the message as erroneous if the *sl-ReportConfigToRemoveList* includes any *sl-ReportConfigId* value that is not part of the current UE configuration.

5.8.10.2.7 Sidelink reporting configuration addition/modification

The UE shall:

- 1> for each sl-ReportConfigId included in the received sl-ReportConfigToAddModList:
 - 2> if an entry with the matching *sl-ReportConfigId* exists in the *sl-ReportConfigList* within the *VarMeasConfigSL*, for this entry:
 - 3> reconfigure the entry with the value received for this *sl-ReportConfig*;
 - 3> for each *sl-MeasId* associated with this *sl-ReportConfigId* included in the *sl-MeasIdList* within the *VarMeasConfigSL*, if any:
 - 4> remove the measurement reporting entry for this *sl-MeasId* from the *VarMeasReportListSL*, if included;
 - 4> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*;

2> else:

3> add a new entry for the received sl-ReportConfig to the sl-ReportConfigList within the VarMeasConfigSL.

5.8.10.2.8 Sidelink quantity configuration

- 1> for each received *sl-QuantityConfig*:
 - 2> set the corresponding parameter(s) in *sl-QuantityConfig* within *VarMeasConfigSL* to the value of the received *sl-QuantityConfig* parameter(s);
- 1> for each *sl-MeasId* included in the *sl-MeasIdList* within *VarMeasConfigSL*:
 - 2> remove the measurement reporting entry for this sl-MeasId from the VarMeasReportListSL, if included;
 - 2> stop the periodical reporting timer and reset the associated information (e.g. *sl-TimeToTrigger*) for this *sl-MeasId*.

5.8.10.3 Performing NR sidelink measurements

5.8.10.3.1 General

A UE shall derive NR sidelink measurement results by measuring one or multiple DMRS associated per PC5-RRC connection as configured by the peer UE associated, as described in 5.8.10.3.2. For all NR sidelink measurement results the UE applies the layer 3 filtering as specified in clause 5.5.3.2, before using the measured results for evaluation of reporting criteria and measurement reporting. In this release, only NR sidelink RSRP can be configured as trigger quantity and reporting quantity.

The UE shall:

- 1> for each sl-MeasId included in the sl-MeasIdList within VarMeasConfigSL:
 - 2> if the *sl-MeasObject* is associated to NR sidelink and the *sl-RS-Type* is set to *dmrs*:
 - 3> derive the layer 3 filtered NR sidelink measurement result based on DMRS for the trigger quantity and each measurement quantity indicated in *sl-ReportQuantity* using parameters from the associated *sl-MeasObject*, as described in 5.8.10.3.2.
 - 2> perform the evaluation of reporting criteria as specified in 5.8.10.4.

5.8.10.3.2 Derivation of NR sidelink measurement results

The UE may be configured by the peer UE associated to derive NR sidelink RSRP measurement results per PC5-RRC connection associated to the NR sidelink measurement objects based on parameters configured in the *sl-MeasObject* and in the *sl-ReportConfig*.

The UE shall:

- 1> for each NR sidelink measurement quantity to be derived based on NR sidelink DMRS:
 - 2> derive the corresponding measurement of NR sidelink frequency indicated quantity based on DMRS as described in TS 38.215 [9] in the concerned *sl-MeasObject*;
 - 2> apply layer 3 filtering as described in 5.5.3.2;

5.8.10.4 Sidelink measurement report triggering

5.8.10.4.1 General

- 1> for each sl-MeasId included in the sl-MeasIdList within VarMeasConfigSL:
 - 2> if the *sl-ReportType* is set to *sl-EventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *sl-EventId* of the corresponding *sl-ReportConfig* within *VarMeasConfigSL*, is fulfilled for NR sidelink frequency for all NR sidelink measurements after layer 3 filtering taken during *sl-TimeToTrigger* defined for this event within the *VarMeasConfigSL*, while the *VarMeasReportListSL* does not include a NR sidelink measurement reporting entry for this *sl-MeasId* (a first NR sidelink frequency triggers the event):

- 3> include a NR sidelink measurement reporting entry within the VarMeasReportListSL for this sl-MeasId;
- 3> set the sl-NumberOfReportsSent defined within the VarMeasReportListSL for this sl-MeasId to 0;
- 3> include the concerned NR sidelink frequency in the *sl-FrequencyTriggeredList* defined within the *VarMeasReportListSL* for this *sl-MeasId*;
- 3> initiate the NR sidelink measurement reporting procedure, as specified in 5.8.10.5;
- 2> else if the *sl-ReportType* is set to *sl-EventTriggered* and if the entry condition applicable for this event, i.e. the event corresponding with the *sl-EventId* of the corresponding *sl-ReportConfig* within *VarMeasConfigSL*, is fulfilled for NR sidelink frequency not included in the *sl-FrequencyTriggeredList* for all NR sidelink measurements after layer 3 filtering taken during *sl-TimeToTrigger* defined for this event within the *VarMeasConfigSL* (a subsequent NR sidelink frequency triggers the event):
 - 3> set the sl-NumberOfReportsSent defined within the VarMeasReportListSL for this sl-MeasId to 0;
 - 3> include the concerned NR sidelink frequency in the *sl-FrequencyTriggeredList* defined within the *VarMeasReportListSL* for this *sl-MeasId*;
 - 3> initiate the NR sidelink measurement reporting procedure, as specified in 5.8.10.5;
- 2> else if the *sl-ReportType* is set to *sl-EventTriggered* and if the leaving condition applicable for this event is fulfilled for NR sidelink frequency included in the *sl-FrequencyTriggeredList* defined within the *VarMeasReportListSL* for this *sl-MeasId* for all NR sidelink measurements after layer 3 filtering taken during *sl-TimeToTrigger* defined within the *VarMeasConfigSL* for this event:
 - 3> remove the concerned NR sidelink frequency in the *sl-FrequencyTriggeredList* defined within the *VarMeasReportListSL* for this *sl-MeasId*;
 - 3> if sl-ReportOnLeave is set to true for the corresponding reporting configuration:
 - 4> initiate the NR sidelink measurement reporting procedure, as specified in 5.8.10.5;
 - 3> if the sl-FrequencyTriggeredList defined within the VarMeasReportListSL for this sl-MeasId is empty:
 - 4> remove the NR sidelink measurement reporting entry within the *VarMeasReportListSL* for this *sl-MeasId*:
 - 4> stop the periodical reporting timer for this *sl-MeasId*, if running;
- 2> if sl-ReportType is set to sl-Periodical and if a (first) NR sidelink measurement result is available:
 - 3> include a NR sidelink measurement reporting entry within the VarMeasReportListSL for this sl-MeasId;
 - 3> set the sl-NumberOfReportsSent defined within the VarMeasReportListSL for this sl-MeasId to 0;
 - 3> initiate the NR sidelink measurement reporting procedure, as specified in 5.8.10.5, immediately after the quantity to be reported becomes available for the NR sidelink frequency:
- 2> upon expiry of the periodical reporting timer for this *sl-MeasId*:
 - 3> initiate the NR sidelink measurement reporting procedure, as specified in 5.8.10.5.

5.8.10.4.2 Event S1 (Serving becomes better than threshold)

The UE shall:

- 1> consider the entering condition for this event to be satisfied when condition S1-1, as specified below, is fulfilled;
- 1> consider the leaving condition for this event to be satisfied when condition S1-2, as specified below, is fulfilled;
- 1> for this NR sidelink measurement, consider the NR sidelink frequency corresponding to the associated *sl-MeasObject* associated with this event.

Inequality S1-1 (Entering condition)

Ms - Hys > Thresh

Inequality S1-2 (Leaving condition)

Ms + Hys < Thresh

The variables in the formula are defined as follows:

Ms is the NR sidelink measurement result of the NR sidelink frequency, not taking into account any offsets.

Hys is the hysteresis parameter for this event (i.e. sl-Hysteresis as defined within sl-ReportConfig for this event).

Thresh is the threshold parameter for this event (i.e. s1-Threshold as defined within s1-ReportConfig for this event).

Ms is expressed in dBm in case of RSRP.

Hys is expressed in dB.

Thresh is expressed in the same unit as **Ms**.

5.8.10.4.3 Event S2 (Serving becomes worse than threshold)

The UE shall:

- 1> consider the entering condition for this event to be satisfied when condition S2-1, as specified below, is fulfilled;
- 1> consider the leaving condition for this event to be satisfied when condition S2-2, as specified below, is fulfilled;
- 1> for this NR sidelink measurement, consider the NR sidelink frequency indicated by the *sl-MeasObject* associated to this event.

Inequality S2-1 (Entering condition)

Ms + Hys < Thresh

Inequality S2-2 (Leaving condition)

Ms - Hys > Thresh

The variables in the formula are defined as follows:

Ms is the NR sidelink measurement result of the NR sidelink frequency, not taking into account any offsets.

Hys is the hysteresis parameter for this event (i.e. sl-Hysteresis as defined within sl-ReportConfig for this event).

Thresh is the threshold parameter for this event (i.e. s2-Threshold as defined within sl-ReportConfig for this event).

Ms is expressed in dBm in case of RSRP.

Hys is expressed in dB.

Thresh is expressed in the same unit as *Ms*.

5.8.10.5 Sidelink measurement reporting

5.8.10.5.1 General



Figure 5.8.10.5.1-1: NR sidelink measurement reporting

The purpose of this procedure is to transfer measurement results from the UE to the peer UE associated.

For the *sl-MeasId* for which the NR sidelink measurement reporting procedure was triggered, the UE shall set the *sl-MeasResults* within the *MeasurementReportSidelink* message as follows:

- 1> set the sl-MeasId to the measurement identity that triggered the NR sidelink measurement reporting;
- 1> if the *sl-ReportConfig* associated with the *sl-MeasId* that triggered the NR sidelink measurement reporting is set to *sl-EventTriggered* or *sl-Periodical*:
 - 2> set *sl-ResultDMRS* within *sl-MeasResult* to include the NR sidelink DMRS based quantity indicated in the *sl-ReportQuantity* within the concerned *sl-ReportConfig*;
- 1> increment the sl-NumberOfReportsSent as defined within the VarMeasReportListSSL for this sl-MeasId by 1;
- 1> stop the periodical reporting timer, if running;
- 1> if the *sl-NumberOfReportsSent* as defined within the *VarMeasReportListSL* for this *sl-MeasId* is less than the *sl-ReportAmount* as defined within the corresponding *sl-ReportConfig* for this *sl-MeasId*:
 - 2> start the periodical reporting timer with the value of *sl-ReportInterval* as defined within the corresponding *sl-ReportConfig* for this *sl-MeasId*;

1> else:

- 2> if the *sl-ReportType* is set to *sl-Periodical*:
 - 3> remove the entry within the *VarMeasReportListSL* for this *sl-MeasId*;
 - 3> remove this *sl-MeasId* from the *sl-MeasIdList* within *VarMeasConfigSL*;
- 1> submit the MeasurementReportSidelink message to lower layers for transmission, upon which the procedure ends.

5.8.11 Zone identity calculation

The UE shall determine an identity of the zone (i.e. Zone_id) in which it is located using the following formulae, if *sl*-ZoneConfig is configured:

$$x_1$$
= Floor (x / L) Mod 64;
 y_1 = Floor (y / L) Mod 64;
Zone_id = $y_1 * 64 + x_1$.

The parameters in the formulae are defined as follows:

- **L** is the value of *sl-ZoneLength* included in *sl-ZoneConfig*;
- **x** is the geodesic distance in longitude between UE's current location and geographical coordinates (0, 0) according to WGS84 model [58] and it is expressed in meters;
- \mathbf{y} is the geodesic distance in latitude between UE's current location and geographical coordinates (0,0) according to WGS84 model [58] and it is expressed in meters.

NOTE: How the calculated zone_id is used is specified in TS 38.321 [3].

5.8.12 DFN derivation from GNSS

When the UE selects GNSS as the synchronization reference source, the DFN, the subframe number within a frame and slot number within a frame used for NR sidelink communication/discovery are derived from the current UTC time, by the following formulae:

```
DFN= Floor (0.1*(Tcurrent -Tref-OffsetDFN)) mod 1024

SubframeNumber= Floor (Tcurrent -Tref-OffsetDFN) mod 10
```

 $SlotNumber = Floor ((Tcurrent - Tref - OffsetDFN)*2^{\mu}) \mod (10*2^{\mu})$

Where:

Tcurrent is the current UTC time obtained from GNSS. This value is expressed in milliseconds;

Tref is the reference UTC time 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Thursday, December 31, 1899 and Friday, January 1, 1900). This value is expressed in milliseconds;

OffsetDFN is the value sl-OffsetDFN if configured, otherwise it is zero. This value is expressed in milliseconds.

 μ =0/1/2/3 corresponding to the 15/30/60/120 kHz of SCS for SL, respectively.

NOTE 1: In case of leap second change event, how UE obtains the scheduled time of leap second change to adjust *Tcurrent* correspondingly is left to UE implementation. How UE handles to avoid the sudden discontinuity of DFN is left to UE implementation.

NOTE 2: Void.

5.8.13 NR sidelink discovery

5.8.13.1 General

The purpose of this procedure is to perform NR sidelink discovery as specified in TS 23.304 [65].

5.8.13.2 NR sidelink discovery monitoring

A UE capable of NR sidelink discovery that is configured by upper layers to monitor NR sidelink discovery messages shall:

- 1> if the frequency used for NR sidelink discovery is included in *sl-FreqInfoToAddModList* in *RRCReconfiguration* message and *sl-DiscConfig* is included in *RRCReconfiguration*; or if the frequency used for NR sidelink discovery is included in *sl-FreqInfoList* included in *SIB12* and *sl-DiscConfigCommon* is included in *SIB12*:
 - 2> if the UE is configured with *sl-DiscRxPool* for NR sidelink discovery reception included in *RRCReconfiguration* message with *reconfigurationWithSync* (i.e. handover):
 - 3> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool indicated by *sl-DiscRxPool* for NR sidelink discovery reception in *RRCReconfiguration*;
 - 2> else if the UE is configured with *sl-RxPool* for NR sidelink discovery reception included in *RRCReconfiguration* message with *reconfigurationWithSync* (i.e. handover):
 - 3> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool indicated by *sl-RxPool* for NR sidelink discovery reception in *RRCReconfiguration*;
 - 2> else if the cell chosen for NR sidelink discovery reception provides SIB12:
 - 3> if sl-DiscRxPool for NR sidelink is included in SIB12:
 - 4> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool indicated by *sl-DiscRxPool* for NR sidelink discovery reception *in SIB12*;
 - 3> else if *sl-RxPool* for NR sidelink is included in *SIB12*:
 - 4> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool indicated by *sl-RxPool* for NR sidelink discovery reception *in SIB12*;

1> else:

- 2> if out of coverage on the concerned frequency for NR sidelink discovery:
 - 3> if sl-DiscRxPool was preconfigured:

4> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool that was preconfigured by *sl-DiscRxPool* for NR sidelink discovery reception in *SL-PreconfigurationNR*, as defined in clause 9.3;

3> else:

4> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool that was preconfigured by *sl-RxPool* for NR sidelink discovery reception in *SL-PreconfigurationNR*, as defined in clause 9.3;

NOTE: If *sl-DiscRxPool* and *sl-RxPool* are both include in SIB12 or preconfigured, it is up to UE implementation whether to monitor sidelink control information and the corresponding data using the resource pool indicated by *sl-RxPool* for NR sidelink discovery reception.

5.8.13.3 NR sidelink discovery transmission

A UE capable of NR sidelink discovery that is configured by upper layer to transmit NR sidelink discovery message shall:

- 1> if the frequency used for NR sidelink discovery is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message; or if the frequency used for NR sidelink discovery is included in *sl-FreqInfoList* within *SIB12*:
 - 2> if the UE is in RRC_CONNECTED and uses the frequency included in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message:
 - 3> if the UE is acting as NR sidelink U2N Relay UE and *sl-DiscConfig* is included in *RRCReconfiguration*, and if the NR sidelink U2N Relay UE threshold conditions as specified in 5.8.14.2 are met based on *sl-RelayUE-Config*; or
 - 3> if the UE is selecting NR sidelink U2N Relay UE / has a selected NR sidelink U2N Relay UE/ configured with measurement object associated to L2 U2N Relay UEs and *sl-DiscConfig* is included in *RRCReconfiguration*, and if the NR sidelink U2N Remote UE threshold conditions as specified in 5.8.15.2 are met based on *sl-RemoteUE-Config*; or
 - 3> if the UE is performing NR sidelink non-relay discovery:
 - 4> if the UE is configured with *sl-ScheduledConfig*:
 - 5> if T310 for MCG or T311 is running; and if *sl-TxPoolExceptional* is included in *sl-FreqInfoList* for the concerned frequency in *SIB12* or included in *sl-ConfigDedicatedNR* in *RRCReconfiguration*; or
 - 5> if T301 is running and the cell on which the UE initiated RRC connection re-establishment provides *SIB12* including *sl-TxPoolExceptional* for the concerned frequency; or
 - 5> if T304 for MCG is running and the UE is configured with *sl-TxPoolExceptional* included in *sl-ConfigDedicatedNR* for the concerned frequency in *RRCReconfiguration*:
 - 6> configure lower layers to perform the sidelink resource allocation mode 2 based on random selection using the resource pool indicated by *sl-TxPoolExceptional* as defined in TS 38.321 [3];
 - 5> else:
 - 6> configure lower layers to perform the sidelink resource allocation mode 1 using the resource pool indicated by *sl-DiscTxPoolScheduling* or *sl-TxPoolScheduling* for NR sidelink discovery transmission on the concerned frequency in *RRCReconfiguration*;
 - 5> if T311 is running, configure the lower layers to release the resources indicated by *rrc-ConfiguredSidelinkGrant* (if any);
 - 4> if the UE is configured with *sl-UE-SelectedConfig*:

- 5> if the *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency is included in the *sl-ConfigDedicatedNR* within *RRCReconfiguration*, and if a result of full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency included in *sl-ConfigDedicatedNR* within *RRCReconfiguration* is not available in accordance with TS 38.214 [19]; or
- 5> if the *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency is not included in the *sl-ConfigDedicatedNR* within *RRCReconfiguration*, and a result of full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency included in *sl-ConfigDedicatedNR* within *RRCReconfiguration* is not available in accordance with TS 38.214 [19];
 - 6> if sl-TxPoolExceptional for the concerned frequency is included in RRCReconfiguration; or
 - 6> if the PCell provides SIB12 including sl-TxPoolExceptional in sl-FreqInfoList for the concerned frequency:
 - 7> configure lower layers to perform the sidelink resource allocation mode 2 based on random selection using the resource pool indicated by *sl-TxPoolExceptional* as defined in TS 38.321 [3];
- 5> else, if the *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency is included in the *sl-ConfigDedicatedNR* within *RRCReconfiguration*:
 - 6> configure lower layers to perform the sidelink resource allocation mode 2 based on resource selection operation according to *sl-AllowedResourceSelectionConfig* (as defined in TS 38.321 [3] and TS 38.214 [19]) using the pools of resources indicated by *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency in *RRCReconfiguration*;
- 5> else, if the *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency is included in the *sl-ConfigDedicatedNR* within *RRCReconfiguration*:
 - 6> configure lower layers to perform the sidelink resource allocation mode 2 based on resource selection operation according to *sl-AllowedResourceSelectionConfig* (as defined in TS 38.321 [3] and TS 38.214 [19]) using the pools of resources indicated by *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency in *RRCReconfiguration*;
- 2> else if the cell chosen for NR sidelink discovery transmission provides SIB12:
 - 3> if the UE is acting as NR sidelink U2N Relay UE and *sl-DiscConfigCommon* is included in *SIB12*, and if the NR sidelink U2N Relay UE threshold conditions as specified in 5.8.14.2 are met based on *sl-RelayUE-ConfigCommon* in *SIB12*; or
 - 3> if the UE is selecting NR sidelink U2N Relay UE / has a selected NR sidelink U2N Relay UE and *sl-DiscConfigCommon* is included in *SIB12*, and if the NR sidelink U2N Remote UE threshold conditions as specified in 5.8.15.2 are met based on *sl-RemoteUE-ConfigCommon* in *SIB12*; or
 - 3> if the UE is performing NR sidelink non-relay discovery:
 - 4> if *SIB12* includes *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency, and a result of full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in the *sl-DiscTxPoolSelected* for NR sidelink discovery transmission is available in accordance with TS 38.214 [19] or random selection, if allowed by *sl-AllowedResourceSelectionConfig*, is selected:
 - 5> configure lower layers to perform the sidelink resource allocation mode 2 based on resource selection operation according to *sl-AllowedResourceSelectionConfig* using the pools of resources indicated by *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency in *SIB12* as defined in TS 38.321 [3];
 - 4> else if *SIB12* includes *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency, and a result of full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in the *sl-TxPoolSelectedNormal* for NR

sidelink discovery transmission is available in accordance with TS 38.214 [19] or random selection, if allowed by *sl-AllowedResourceSelectionConfig*, is selected:

- 5> configure lower layers to perform the sidelink resource allocation mode 2 based on resource selection operation according to *sl-AllowedResourceSelectionConfig* using the pools of resources indicated by *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency in *SIB12* as defined in TS 38.321 [3];
- 4> else if SIB12 includes sl-TxPoolExceptional for the concerned frequency:
 - 5> from the moment the UE initiates RRC connection establishment or RRC connection resume, until receiving an *RRCReconfiguration* including *sl-ConfigDedicatedNR*, or receiving an *RRCRelease* or an *RRCReject*; or
 - 5> if a result of full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency in *SIB12* is not available in accordance with TS 38.214 [19]; or
 - 5> if *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency is not included in *SIB12* and if a result of full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency in *SIB12* is not available in accordance with TS 38.214 [19]:
 - 6> configure lower layers to perform the sidelink resource allocation mode 2 based on random selection (as defined in TS 38.321 [3]) using one of the pools of resources indicated by *sl-TxPoolExceptional* for the concerned frequency;
- 1> else if out of coverage on the concerned frequency for NR sidelink discovery:
 - 2> if the UE is acting as L3 U2N Relay UE and if the NR sidelink U2N Relay UE threshold conditions as specified in 5.8.14.2 are met based on *sl-RelayUE-ConfigCommon* in *SidelinkPreconfigNR*; or
 - 2> if the UE is selecting NR sidelink U2N Relay UE / has a selected NR sidelink U2N Relay UE and if the NR sidelink U2N Remote UE threshold conditions as specified in 5.8.15.2 are met based on *sl-RemoteUE-ConfigCommon* in *SidelinkPreconfigNR*; or
 - 2> if the UE is performing NR sidelink non-relay discovery:
 - 3> configure lower layers to perform the sidelink resource allocation mode 2 based on resource selection operation according to *sl-AllowedResourceSelectionConfig* (as defined in TS 38.321 [3] and TS 38.213 [13]) using the pools of resources indicated in *sl-DiscTxPoolSelected* or *sl-TxPoolSelectedNormal* for NR sidelink discovery transmission on the concerned frequency in *SidelinkPreconfigNR*.
- NOTE: It is up to UE implementation to determine, in accordance with TS 38.321[3], which resource pool to use if multiple resource pools are configured, and which resource allocation scheme is used in the AS based on UE capability (for a UE in RRC_IDLE/RRC_INACTIVE) and the allowed resource schemes *sl-allowedResourceSelectionConfig* in the resource pool configuration.

5.8.14 NR sidelink U2N Relay UE operation

5.8.14.1 General

This procedure is used by a UE supporting NR sidelink U2N Relay UE operation configured by upper layers to transmit NR sidelink discovery messages to evaluate AS layer conditions.

5.8.14.2 NR sidelink U2N Relay UE threshold conditions

A UE capable of NR sidelink U2N Relay UE operation shall:

1> if the threshold conditions specified in this clause were previously not met:

- 2> if *threshHighRelay* is not configured; or the RSRP measurement of the PCell, or the cell on which the UE camps, is below *threshHighRelay* by *hystMaxRelay* if configured; and
- 2> if *threshLowRelay* is not configured; or the RSRP measurement of the PCell, or the cell on which the UE camps, is above *threshLowRelay* by *hystMinRelay* if configured:
 - 3> consider the threshold conditions to be met (entry);

1> else:

- 2> if the RSRP measurement of the PCell, or the cell on which the UE camps, is above *threshHighRelay* if configured; or
- 2> if the RSRP measurement of the PCell, or the cell on which the UE camps, is below *threshLowRelay* if configured;
 - 3> consider the threshold conditions not to be met (leave);

5.8.15 NR sidelink U2N Remote UE operation

5.8.15.1 General

This procedure is used by a UE supporting NR sidelink U2N Remote UE operation configured by upper layers to transmit NR sidelink discovery message to evaluate AS layer conditions. The procedure is also used to perform selection and reselection of NR sidelink U2N Relay UE.

5.8.15.2 NR Sidelink U2N Remote UE threshold conditions

A UE capable of NR sidelink U2N Remote UE operation shall:

- 1> if the threshold conditions specified in this clause were previously not met:
 - 2> if *threshHighRemote* is not configured; or the RSRP measurement of the PCell, or the cell on which the UE camps, is below *threshHighRemote* by *hystMaxRemote* if configured, or
 - 2> if the UE has no serving cell:
 - 3> consider the threshold conditions to be met (entry);

1> else:

- 2> if the RSRP measurement of the PCell, or the cell on which the UE camps, is above *threshHighRemote* if configured:
 - 3> consider the threshold conditions not to be met (leave);

The L2 U2N Remote UE considers the cell indicated by *sl-ServingCellInfo* in the *SL-AccessInfo-L2U2N-r17* received from the connected L2 U2N Relay UE as the camping cell.

5.8.15.3 Selection and reselection of NR sidelink U2N Relay UE

A UE capable of NR sidelink U2N Remote UE operation that is configured by upper layers to search for a NR sidelink U2N Relay UE shall:

- 1> if the UE has no serving cell; or
- 1> if the RSRP measurement of the cell on which the UE camps (for L2 and L3 U2N Remote UE in RRC_IDLE or RRC_INACTIVE)/ the PCell (for L3 U2N Remote UE in RRC_CONNECTED) is below *threshHighRemote* within *sl-remoteUE-Config*:
 - 2> if the UE does not have a selected NR sidelink U2N Relay UE; or
 - 2> if the UE has a selected NR sidelink U2N Relay UE, and SL-RSRP of the currently selected NR sidelink U2N Relay UE is available and is below *sl-RSRP-Thresh*; or

- 2> if the UE has a selected NR sidelink U2N Relay UE, and SL-RSRP of the currently selected NR sidelink U2N Relay UE is not available, and SD-RSRP of the currently selected U2N Relay UE is below *sl-RSRP-Thresh*; or
- NOTE 1: U2N Remote UE uses SL-RSRP measurements for relay reselection trigger evaluation when there is data transmission from U2N Relay UE to U2N Remote UE, and it is left to UE implementation whether to use SL-RSRP or SD-RSRP for relay reselection trigger evaluation in case of no data transmission from U2N Relay UE to U2N Remote UE. If SD-RSRP is used, the discovery procedure will be performed between the U2N Remote UE and the selected U2N Relay UE.
 - 2> if the UE has a selected NR sidelink U2N Relay UE, and upper layers indicate not to use the currently selected NR sidelink U2N Relay UE; or
 - 2> if the UE has a selected NR sidelink U2N Relay UE, and upper layers request the release of the PC5-RRC connection; or
 - 2> if the UE has a selected NR sidelink U2N Relay UE, and sidelink radio link failure is detected on the PC5-RRC connection with the current U2N Relay UE as specified in clause 5.8.9.3:
 - 3> perform NR sidelink discovery procedure as specified in clause 5.8.13 in order to search for candidate NR sidelink U2N Relay UEs;
 - 4> when evaluating the one or more detected NR sidelink U2N Relay UEs, apply layer 3 filtering as specified in 5.5.3.2 across measurements that concern the same U2N Relay UE ID and using the *sl-FilterCoefficientRSRP* in *SystemInformationBlockType12* (if in RRC_IDLE/INACTIVE), the *sl-FilterCoefficientRSRP* in *sl-ConfigDedicatedNR* (if in RRC_CONNECTED) or the preconfigured *sl-FilterCoefficientRSRP* as defined in 9.3 (out of coverage), before using the SD-RSRP measurement results;
 - 4> consider a candidate NR sidelink U2N Relay UE for which SD-RSRP exceeds *sl-RSRP-Thresh* by *sl-HystMin* has met the AS criteria;
 - 3> if the UE detects any suitable NR sidelink U2N Relay UE(s):
 - 4> consider one of the available suitable NR sidelink U2N relay UE(s) can be selected;
- NOTE 2: A candidate NR sidelink U2N Relay UE which meets all AS layer criteria defined in 5.8.15.3 and higher layer criteria defined in TS 23.304 [65] can be regarded as suitable NR sidelink U2N Relay UE by the NR sidelink U2N Remote UE. If multiple suitable NR sidelink U2N Relay UEs are available, it is up to Remote UE implementation to choose one NR sidelink U2N Relay UE. The details of the interaction with upper layers are up to UE implementation.
- NOTE 3: For L2 U2N Remote UEs in RRC_IDLE/INACTIVE and L3 U2N Remote UEs, the cell (re)selection procedure and relay (re)selection procedure run independently. If both suitable cells and suitable NR sidelink U2N Relay UEs are available, it is up to NR sidelink U2N Remote UE implementation to select either a cell or a NR sidelink U2N Relay UE. Furthermore, L3 U2N Remote UE's selection on both cell and NR sidelink U2N Relay UE is also based on UE implementation.
 - 3> else:

4> consider no NR sidelink U2N Relay UE to be selected.

5.9 MBS Broadcast

5.9.1 Introduction

5.9.1.1 General

UE receiving or interested to receive MBS broadcast service(s) applies MBS broadcast procedures described in this clause as well as the MBS Interest Indication procedure as specified in clause 5.9.4.

MBS broadcast configuration information is provided on MCCH logical channel. MCCH carries the MBSBroadcastConfiguration message which indicates the MBS broadcast sessions that are provided in the cell as well as the corresponding scheduling related information for these sessions. Optionally, the *MBSBroadcastConfiguration* message may also contain a list of neighbour cells providing the same broadcast MBS service(s) as provided in the current cell. The configuration information required by the UE to receive MCCH is provided in *SIB20*. Additionally, System Information provides also an information related to service continuity of MBS broadcast in *SIB21*.

5.9.1.2 MCCH scheduling

The MCCH information (i.e. information transmitted in messages sent over MCCH) is transmitted periodically, using a configurable repetition period and within a configured transmission window. MCCH transmissions (and the associated radio resources and MCS) are indicated via the PDCCH addressed to MCCH-RNTI. PDCCH monitoring occasion(s) for MCCH transmission are determined according to the common search space indicated by searchspaceMCCH. If searchspaceMCCH is set to zero, PDCCH monitoring occasions for MCCH message reception in the MCCH transmission window are the same as PDCCH monitoring occasions for SIB1 where the mapping between PDCCH monitoring occasions and SSBs is specified in TS 38.213[13]. If searchspaceMCCH is not set to zero, PDCCH monitoring occasions for MCCH message are determined based on search space indicated by searchspaceMCCH. PDCCH monitoring occasions for MCCH message which are not overlapping with UL symbols (determined according to tdd-UL-DL-ConfigurationCommon) are sequentially numbered from one in the MCCH transmission window. The [x×N+K]th PDCCH monitoring occasion for MCCH message in MCCH transmission window corresponds to the Kth transmitted SSB, where x = 0, 1, ...X-1, K = 1, 2, ...N, N is the number of actual transmitted SSBs determined according to ssb-PositionsInBurst in SIB1 and X is equal to CEIL(number of PDCCH monitoring occasions in MCCH transmission window/N). The actual transmitted SSBs are sequentially numbered from one in ascending order of their SSB indexes. The UE assumes that, in the MCCH transmission window, PDCCH for an MCCH message is transmitted in at least one PDCCH monitoring occasion corresponding to each transmitted SSB and thus the selection of SSB for the reception MCCH messages is up to UE implementation.

5.9.1.3 MCCH information validity and notification of changes

Change of MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same MCCH information may be transmitted a number of times, as defined by its scheduling (which is based on a repetition period).

When the network changes (some of) the MCCH information, it notifies the UEs about the change starting from the beginning of the MCCH modification period via PDCCH which schedules the MCCH in every repetition in that modification period.

Upon receiving a change notification, a UE receiving or interested to receive MBS services transmitted using MBS broadcast acquires the new MCCH information starting from the same slot. The UE applies the previously acquired MCCH information until the UE acquires the new MCCH information. The notification is transmitted with a 2-bit bitmap, see TS 38.212 [17] clause 7.3.1.5.1. The MSB in the 2-bit bitmap, when set to '1', indicates the start of new MBS service(s). The LSB in the 2-bit bitmap, when set to '1', indicates modification of MCCH information other than the change caused by start of new MBS service(s), e.g. modification of a configuration of an on-going MBS session(s), MBS session(s) stop or neighbouring cell information modification.

5.9.2 MCCH information acquisition

5.9.2.1 General



Figure 5.9.2.1-1: MCCH information acquisition

The UE applies the MCCH information acquisition procedure to acquire the MBS broadcast configuration information broadcasted by the network. The procedure applies to MBS capable UEs interested to receive or that are receiving MBS

broadcast services that are in RRC_IDLE, RRC_INACTIVE or RRC_CONNECTED with an active BWP with common search space configured by *searchSpaceMCCH*.

5.9.2.2 Initiation

A UE shall apply the MCCH information acquisition procedure upon becoming interested to receive MBS broadcast services. A UE interested to receive MBS broadcast services shall apply the MCCH information acquisition procedure upon entering the cell providing SIB20 (e.g. upon power on, following UE mobility), upon receiving SIB20 of an SCell via dedicated signalling and upon receiving a notification that the MCCH information has changed due to the start of new MBS service(s). A UE that is receiving data via broadcast MRB shall apply the MCCH information acquisition procedure upon receiving a notification that the MCCH information has changed due to MCCH information modification other than the change caused by the start of new MBS service(s).

- NOTE 1: It is up to UE implementation how to address a possibility of the UE missing an MCCH change notification.
- NOTE 2: It is up to UE implementation to use the cell/tracking area list in the USD to avoid acquiring the MCCH when the UE is outside the MBS service area of the MBS broadcast service.

Unless explicitly stated otherwise in the procedural specification, the MCCH information acquisition procedure overwrites any stored MCCH information, i.e. delta configuration is not applicable for MCCH information and the UE discontinues using a field if it is absent in MCCH information.

5.9.2.3 MCCH information acquisition by the UE

An MBS capable UE interested to receive or receiving an MBS broadcast service shall:

- 1> if the procedure is triggered by an MCCH information change notification:
 - 2> start acquiring the MBSBroadcastConfiguration message on MCCH in the concerned cell from the slot in which the change notification was received;
- 1> if the UE enters a cell broadcasting SIB20; or
- 1> if the UE receives sCellSIB20:
 - 2> acquire the MBSBroadcastConfiguration message on MCCH in the concerned cell at the next repetition period.

5.9.2.4 Actions upon reception of the MBSBroadcastConfiguration message

No UE requirements related to the contents of the *MBSBroadcastConfiguration* message apply other than those specified elsewhere e.g. within the corresponding field descriptions.

5.9.3 Broadcast MRB configuration

5.9.3.1 General

The broadcast MRB configuration procedure is used by the UE to configure PDCP, RLC, MAC and the physical layer upon starting and/or stopping to receive a broadcast MRB transmitted on MTCH, or upon modification of a configuration of a broadcast MRB received by the UE. The procedure applies to MBS capable UEs that are interested to receive or that are receiving an MBS broadcast service that are in RRC_IDLE, RRC_INACTIVE or RRC_CONNECTED with an active BWP with common search space configured by <code>searchSpaceMTCH</code> or <code>searchSpaceMCCH</code>.

NOTE: How to perform a modification of a broadcast MRB which is already configured in the UE is left to UE implementation.

5.9.3.2 Initiation

The UE applies the broadcast MRB establishment procedure to start receiving an MBS session of an MBS broadcast service it is interested in. The procedure may be initiated e.g. upon start of the MBS session, upon entering a cell providing an MBS broadcast service the UE is interested in, upon becoming interested in the ongoing MBS broadcast service, upon removal of the UE capability limitations inhibiting reception of the ongoing MBS broadcast service UE is interested in.

The UE applies the broadcast MRB release procedure to stop receiving a session of an MBS broadcast service. The procedure may be initiated e.g. upon stop of the MBS session, upon leaving the cell broadcasting the MBS service the UE is interested in, upon losing interest in the MBS service, when capability limitations start inhibiting reception of the concerned service.

5.9.3.3 Broadcast MRB establishment

Upon a broadcast MRB establishment, the UE shall:

- 1> establish a PDCP entity and an RLC entity in accordance with *MRB-InfoBroadcast* for this broadcast MRB included in the *MBSBroadcastConfiguration* message and the configuration specified in 9.1.1.7;
- 1> configure the MAC layer in accordance with the *mtch-SchedulingInfo* (if included);
- 1> configure the physical layer in accordance with the *mbs-SessionInfoList*, *searchSpaceMTCH*, and *pdsch-ConfigMTCH*, applicable for the broadcast MRB;
- 1> receive DL-SCH on the cell where the *MBSBroadcastConfiguration* message was received for the established broadcast MRB using *g-RNTI* and *mtch-SchedulingInfo* (if included) in this message for this MBS broadcast service;
- 1> if an SDAP entity with the received mbs-SessionId does not exist:
 - 2> establish an SDAP entity as specified in TS 37.324 [24] clause 5.1.1.
 - 2> indicate the establishment of the user plane resources for the mbs-SessionId to upper layers.

5.9.3.4 Broadcast MRB release

Upon broadcast MRB release for MBS broadcast service, the UE shall:

- 1> release the PDCP entity, RLC entity as well as the related MAC and physical layer configuration;
- 1> if the SDAP entity associated with the corresponding *mbs-SessionId* has no associated MRB:
 - 2> release the SDAP entity, as specified in TS 37.324 [24] clause 5.1.2;
 - 2> indicate the release of the user plane resources for the *mbs-SessionId* to upper layers.

5.9.4 MBS Interest Indication

5.9.4.1 General

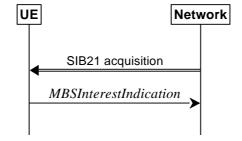


Figure 5.9.4.1-1: MBS Interest Indication

The purpose of this procedure is to inform the network that the UE in RRC_CONNECTED is receiving or is interested to receive MBS broadcast service(s) and to inform the network about the priority of MBS broadcast versus unicast and multicast MRB reception. MBS Interest Indication can only be sent after AS security activation.

5.9.4.2 Initiation

An MBS capable UE in RRC_CONNECTED may initiate the procedure in several cases including upon successful connection establishment/resume, upon entering or leaving the broadcast service area, upon MBS broadcast session start or stop, upon change of interest, upon change of priority between MBS broadcast reception and unicast/multicast reception, upon change to a PCell providing *SIB21* (i.e. where the *SIB1* scheduling information contains *SIB21*), upon receiving *SIB20* of an SCell via dedicated signalling, upon handover, and upon RRC connection re-establishment.

Upon initiating the procedure, the UE shall:

- 1> if SIB21 is provided by the PCell:
 - 2> ensure having a valid version of SIB21 for the PCell;
 - 2> if the UE did not transmit MBS Interest Indication since last entering RRC_CONNECTED state; or
 - 2> if since the last time the UE transmitted an MBS Interest Indication, the UE connected to a PCell not providing *SIB21*:
 - 3> if the set of MBS broadcast frequencies of interest, determined in accordance with 5.9.4.3, is not empty:
 - 4> set the contents of MBS Interest Indication according to 5.9.4.5 and initiate transmission of the *MBSInterestIndication* message;

2> else:

- 3> if the set of MBS broadcast frequencies of interest, determined in accordance with 5.9.4.3, is different from *mbs-FreqList* included in the last transmission of the MBS Interest Indication; or
- 3> if the prioritisation of reception of all indicated MBS broadcast frequencies compared to reception of any of the established unicast bearers and multicast MRBs has changed since the last transmission of the MBS Interest Indication:
 - 4> set the contents of MBS Interest Indication according to 5.9.4.5 and initiate transmission of the *MBSInterestIndication* message;
- NOTE: The UE may send MBS Interest Indication even when it is able to receive the MBS services it is interested in, i.e. to avoid that the network allocates a configuration inhibiting MBS broadcast reception.
 - 3> else if SIB20 is provided for the PCell or for the SCell:
 - 4> if since the last time the UE transmitted the MBS Interest Indication, the UE connected to a PCell not providing *SIB20* and the UE was not provided with *SIB20* for an SCell; or
 - 4> if the set of MBS broadcast services of interest determined in accordance with 5.9.4.4 is different from *mbs-ServiceList* included in the last transmission of the MBS Interest Indication:
 - 5> set the contents of MBS Interest Indication according to 5.9.4.5 and initiate the transmission of *MBSInterestIndication* message.

5.9.4.3 MBS frequencies of interest determination

- 1> consider a frequency to be part of the MBS frequencies of interest if the following conditions are met:
 - 2> at least one MBS session the UE is receiving or interested to receive via a broadcast MRB is ongoing or about to start; and
- NOTE 1: The UE may determine whether the session is ongoing from the start and stop time indicated in the User Service Description (USD), see TS 38.300 [2] or TS 23.247 [67].

- 2> for at least one of these MBS sessions, *SIB21* acquired from the PCell includes mapping between the concerned frequency and one or more MBS FSAIs indicated in the USD for this session, or for at least one of these MBS sessions, the concerned frequency is not included in *SIB21* but is indicated in the USD for this session; and
- NOTE 2: The UE considers a frequency to be part of the MBS frequencies of interest even though NG-RAN may (temporarily) not employ a broadcast MRB for the concerned session, i.e., the UE does not verify if the session is indicated on MCCH.
 - 2> the *supportedBandCombinationList* the UE included in *UE-NR-Capability* contains at least one band combination including the concerned MBS frequency.
- NOTE 3: When evaluating which frequencies the UE is capable of receiving, the UE does not take into account whether they are currently configured as serving frequencies.

5.9.4.4 MBS services of interest determination

The UE shall:

- 1> consider an MBS service to be part of the MBS services of interest if the following conditions are met:
 - 2> the UE is receiving or interested to receive this service via a broadcast MRB; and
 - 2> the session of this service is ongoing or about to start; and
 - 2> one or more MBS FSAIs in the USD for this service is included in *SIB21* acquired from the PCell for a frequency belonging to the set of MBS frequencies of interest, determined according to 5.9.4.3 or *SIB21* acquired from the PCell does not provide the frequency mapping for the concerned service but that frequency is included in the USD of this service.

NOTE: The UE may determine whether the session is ongoing from the start and stop time indicated in the User Service Description (USD), see TS 38.300 [2] or TS 23.247 [67].

5.9.4.5 Setting of the contents of MBS Interest Indication

The UE shall set the contents of the MBS Interest Indication as follows:

- 1> if the set of MBS frequencies of interest, determined in accordance with 5.9.4.3, is not empty:
 - 2> include *mbs-FreqList* and set it to include the MBS frequencies of interest sorted by decreasing order of interest, using the *absoluteFrequencySSB* for serving frequency, if applicable, and the *ARFCN-ValueNR*(s) as included in *SIB21* or in USD (for neighbouring frequencies);
 - 2> include *mbs-Priority* if the UE prioritises reception of all indicated MBS frequencies above reception of any of the unicast bearers and multicast MRBs;
- NOTE: If the UE prioritises MBS broadcast reception and unicast/multicast data cannot be supported because of congestion on the MBS carrier(s), NG-RAN may for example initiate release of unicast bearers/multicast MRBs.
 - 2> if SIB20 is provided for the PCell or for the SCell:
 - 3> include *mbs-ServiceList* and set it to indicate the set of MBS services of interest sorted by decreasing order of interest determined in accordance with 5.9.4.4.

6 Protocol data units, formats and parameters (ASN.1)

6.1 General

6.1.1 Introduction

The contents of each RRC message is specified in clause 6.2 using ASN.1 to specify the message syntax and using tables when needed to provide further detailed information about the fields specified in the message syntax. The syntax of the information elements that are defined as stand-alone abstract types is further specified in a similar manner in clause 6.3.

Usage of the text "Network always configures the UE with a value for this field" in the field description indicates that the network has to provide a value for the field in this or in a previous message based on delta configuration (for an optional field with Need M). It does not imply a mandatory presence of the field.

6.1.2 Need codes and conditions for optional fields

The need for fields to be present in a message or an abstract type, i.e., the ASN.1 fields that are specified as OPTIONAL in the abstract notation (ASN.1), is specified by means of comment text tags attached to the OPTIONAL statement in the abstract syntax. All comment text tags are available for use in the downlink direction for RRC message and in the sidelink for PC5 RRC message. The meaning of each tag is specified in table 6.1.2-1.

If conditions are used, a conditional presence table is provided for the message or information element specifying the need of the field for each condition case. The table also specifies whether UE maintains or releases the value in case the field is absent. The conditions clarify what the UE may expect regarding the setting of the message by the network for the RRC message or by the peer UE in the sidelink RRC message. Violation of conditions is regarded as invalid network behaviour when transmitting downlink RRC message or invalid UE behavior when transmitting PC5 RRC message, which the UE is not required to cope with. Hence the general error handling defined in 10.4 does not apply in case a field is absent although it is mandatory according to the CondC or CondM condition.

For guidelines on the use of need codes and conditions, see Annex A.6 and A.7.

Table 6.1.2-1: Meaning of abbreviations used to specify the need for fields to be present

Abbreviation	Meaning
Cond conditionTag	Conditionally present
	Presence of the field is specified in a tabular form following the ASN.1 segment.
CondC conditionTag	Configuration condition
	Presence of the field is conditional to other configuration settings.
CondM conditionTag	Message condition
	Presence of the field is conditional to other fields included in the message.
Need S	Specified
	Used for (configuration) fields, whose field description or procedure specifies the UE behavior performed upon receiving a
	message with the field absent (and not if field description or procedure specifies the UE behavior when field is not configured).
Need M	Maintain
	Used for (configuration) fields that are stored by the UE i.e. not one-shot. Upon receiving a message with the field absent, the UE
	maintains the current value.
Need N	No action (one-shot configuration that is not maintained)
	Used for (configuration) fields that are not stored and whose presence causes a one-time action by the UE. Upon receiving
	message with the field absent, the UE takes no action.
Need R	Release
	Used for (configuration) fields that are stored by the UE i.e. not one-shot. Upon receiving a message with the field absent, the UE
	releases the current value.

NOTE: In this version of the specification, the condition tags CondC and CondM are not used.

Any field with Need M or Need N in system information shall be interpreted as Need R.

The need code used within a CondX definition only applies for the case (part of the condition) where it is defined: A condition may have different need codes for different parts of the condition. In particular, the CondX definition may contain the following "otherwise the field is absent" parts:

- "Otherwise, the field is absent": The field is not relevant or should not be configured when this part of the condition applies. In particular, the UE behaviour is not defined when the field is configured via another part of the condition and is reconfigured to this part of the condition. A need code is not provided when the transition from another part of the condition to this part of the condition is not supported, when the field clearly is a one-shot or there is no difference whether UE maintains or releases the value (e.g., in case the field is mandatory present according to the other part of the condition).
- "Otherwise, the field is absent, Need R": The field is released if absent when this part of the condition applies. This handles UE behaviour in case the field is configured via another part of the condition and this part of the condition applies (which means that network when transmitting downlink RRC message or peer UE transmitting PC5 RRC message can assume UE releases the field if this part of the condition is valid).
- "Otherwise, the field is absent, Need M": The UE retains the field if it was already configured when this part of the condition applies. This means the network when transmitting downlink RRC message or the peer UE when transmitting PC5 RRC message cannot release the field, but UE retains the previously configured value.

Use of different Need codes in different parts of a condition should be avoided.

For downlink RRC message and sidelink PC5 RRC messages, the need codes, conditions and ASN.1 defaults specified for a particular (child) field only apply in case the (parent) field including the particular field is present. Thus, if the parent is absent the UE shall not release the field unless the absence of the parent field implies that.

For (parent) fields without need codes in downlink RRC messages or sidelink PC5 RRC message, if the parent field is absent, UE shall follow the need codes of the child fields. Thus, if parent field is absent, the need code of each child field is followed (i.e. Need R child fields are released, Need M child fields are not modified and the actions for Need S child fields depend on the specified conditions of each field). Examples of (parent) fields in downlink RRC messages and sidelink PC5 RRC message without need codes where this rule applies are:

- nonCriticalExtension fields at the end of a message using empty SEQUENCE extension mechanism,
- groups of non-critical extensions using double brackets (referred to as extension groups), and
- non-critical extensions at the end of a message or at the end of a structure, contained in a BIT STRING or OCTET STRING (referred to as parent extension fields).

The handling of need codes as specified in the previous is illustrated by means of an example, as shown in the following ASN.1.

```
-- /example/ ASN1START
RRCMessage-IEs ::=
                                  SEOUENCE {
    field1
                                      InformationElement1
                                                                      OPTIONAL, -- Need M
    field2
                                      InformationElement2
                                                                      OPTIONAL. -- Need R
    nonCriticalExtension
                                      RRCMessage-v1570-IEs
                                                                      OPTIONAL
RRCMessage-1570-IEs ::=
                                  SEOUENCE {
    field3
                                      InformationElement3
                                                                      OPTIONAL, -- Need M
    nonCriticalExtension
                                      RRCMessage-v1640-IEs
                                                                      OPTIONAL
RRCMessage-v1640-IEs ::=
                                  SEOUENCE {
    field4
                                      InformationElement4
                                                                      OPTIONAL, -- Need R
    nonCriticalExtension
                                      SEOUENCE {}
                                                                      OPTIONAL
InformationElement1 ::=
                                  SEOUENCE {
    field11
                                      InformationElement11
                                                                      OPTIONAL, -- Need M
    field12
                                      InformationElement12
                                                                      OPTIONAL, -- Need R
    . . . ,
    ] ]
                                      InformationElement13
    field13
                                                                      OPTIONAL, -- Need R
    field14
                                      InformationElement14
                                                                      OPTIONAL -- Need M
    11
InformationElement2 ::=
                                  SEOUENCE {
    field21
                                      InformationElement11
                                                                      OPTIONAL, -- Need M
-- ASN1STOP
```

The handling of need codes as specified in the previous implies that:

- if *field1* in *RRCMessage-IEs* is absent, UE does not modify any child fields configured within *field1* (regardless of their need codes);
- if field2 in RRCMessage-IEs is absent, UE releases the field2 (and also its child field field21);
- if field1 or field2 in RRCMessage-IEs is present, UE retains or releases their child fields according to the child field presence conditions;
- if field1 in RRCMessage-IEs is present but the extension group containing field13 and field14 is absent, the UE releases field13 but does not modify field14;
- if nonCriticalExtension defined by IE RRCMessage-v1570-IEs is absent, the UE does not modify field3 but releases field4;

6.1.3 General rules

In the ASN.1 of this specification, the first bit of a bit string refers to the leftmost bit, unless stated otherwise.

Upon reception of a list not using ToAddModList and ToReleaseList structure, the UE shall delete all entries of the list currently in the UE configuration before applying the received list and shall consider each entry as newly created. This applies also to lists whose size is extended (i.e. with a second list structure in the ASN.1 comprising additional entries), unless otherwise specified. This implies that Need M should not be used for fields in the entries of these lists; if used, UE will handle such fields equivalent to a Need R.

6.2 RRC messages

6.2.1 General message structure

NR-RRC-Definitions

This ASN.1 segment is the start of the NR RRC PDU definitions.

```
-- ASN1START
-- TAG-NR-RRC-DEFINITIONS-START
```

NR-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

- -- TAG-NR-RRC-DEFINITIONS-STOP
- -- ASN1STOP

BCCH-BCH-Message

The BCCH-BCH-Message class is the set of RRC messages that may be sent from the network to the UE via BCH on the BCCH logical channel.

- -- ASN1START
- -- TAG-BCCH-BCH-MESSAGE-START

```
BCCH-BCH-Message ::= SEQUENCE {
    message BCCH-BCH-MessageType
}

BCCH-BCH-MessageType ::= CHOICE {
    mib MIB,
    messageClassExtension SEQUENCE {}
}

-- TAG-BCCH-BCH-MESSAGE-STOP
-- ASN1STOP
```

BCCH-DL-SCH-Message

The BCCH-DL-SCH-Message class is the set of RRC messages that may be sent from the network to the UE via DL-SCH on the BCCH logical channel.

```
-- ASN1START
-- TAG-BCCH-DL-SCH-MESSAGE-START
BCCH-DL-SCH-Message ::=
                              SEQUENCE {
   message
                                  BCCH-DL-SCH-MessageType
BCCH-DL-SCH-MessageType ::=
                                  CHOICE {
       systemInformation
                                      SystemInformation,
                                      SIB1
       systemInformationBlockType1
                                  SEQUENCE {}
   messageClassExtension
-- TAG-BCCH-DL-SCH-MESSAGE-STOP
-- ASN1STOP
```

DL-CCCH-Message

The *DL-CCCH-Message* class is the set of RRC messages that may be sent from the Network to the UE on the downlink CCCH logical channel.

```
-- ASN1START
-- TAG-DL-CCCH-MESSAGE-START

DL-CCCH-Message ::= SEQUENCE {
    message DL-CCCH-MessageType
}

DL-CCCH-MessageType ::= CHOICE {
    c1 CHOICE {
        rrcReject RRCReject,
```

```
rrcSetup RRCSetup,
spare2 NULL,
spare1 NULL
},
messageClassExtension SEQUENCE {}

-- TAG-DL-CCCH-MESSAGE-STOP
-- ASN1STOP
```

DL-DCCH-Message

The *DL-DCCH-Message* class is the set of RRC messages that may be sent from the network to the UE on the downlink DCCH logical channel.

```
-- ASN1START
-- TAG-DL-DCCH-MESSAGE-START
DL-DCCH-Message ::=
                                   SEOUENCE {
                                      DL-DCCH-MessageType
   message
DL-DCCH-MessageType ::=
                                  CHOICE {
                                      CHOICE {
   c1
                                          RRCReconfiguration,
       rrcReconfiguration
       rrcResume
                                          RRCResume,
       rrcRelease
                                          RRCRelease,
       rrcReestablishment
                                          RRCReestablishment,
       securityModeCommand
                                          SecurityModeCommand,
       dlInformationTransfer
                                          DLInformationTransfer,
                                          UECapabilityEnquiry,
       ueCapabilityEnquiry
                                          CounterCheck,
       counterCheck
       mobilityFromNRCommand
                                          MobilityFromNRCommand,
       dlDedicatedMessageSegment-r16
                                          DLDedicatedMessageSegment-r16,
       ueInformationRequest-r16
                                          UEInformationRequest-r16,
                                          DLInformationTransferMRDC-r16,
       dlInformationTransferMRDC-r16
       loggedMeasurementConfiguration-r16 LoggedMeasurementConfiguration-r16,
               spare3 NULL, spare2 NULL, spare1 NULL
   -- TAG-DL-DCCH-MESSAGE-STOP
-- ASN1STOP
```

MCCH-Message

The MCCH-Message class is the set of RRC messages that may be sent from the network to the UE on the MCCH logical channel.

-- ASN1START

PCCH-Message

The *PCCH-Message* class is the set of RRC messages that may be sent from the Network to the UE on the PCCH logical channel.

```
-- ASN1START
-- TAG-PCCH-PCH-MESSAGE-START
PCCH-Message ::=
                               SEQUENCE {
    message
                                   PCCH-MessageType
                               CHOICE {
PCCH-MessageType ::=
                                   CHOICE {
    c1
       paging
                                        Paging,
        sparel NULL
    messageClassExtension
                                SEQUENCE {}
-- TAG-PCCH-PCH-MESSAGE-STOP
-- ASN1STOP
```

UL-CCCH-Message

The *UL-CCCH-Message* class is the set of 48-bits RRC messages that may be sent from the UE to the Network on the uplink CCCH logical channel.

```
-- ASN1START
-- TAG-UL-CCCH-MESSAGE-START

UL-CCCH-Message ::= SEQUENCE {
   message UL-CCCH-MessageType
```

UL-CCCH1-Message

The UL-CCCH1-Message class is the set of 64-bits RRC messages that may be sent from the UE to the Network on the uplink CCCH1 logical channel.

```
-- ASN1START
-- TAG-UL-CCCH1-MESSAGE-START
UL-CCCH1-Message ::=
                                SEQUENCE {
    message
                                    UL-CCCH1-MessageType
UL-CCCH1-MessageType ::=
                                CHOICE {
                                    CHOICE {
        rrcResumeRequest1
                                        RRCResumeRequest1,
        spare3 NULL,
        spare2 NULL,
        sparel NULL
    messageClassExtension SEQUENCE {}
-- TAG-UL-CCCH1-MESSAGE-STOP
-- ASN1STOP
```

UL-DCCH-Message

The *UL-DCCH-Message* class is the set of RRC messages that may be sent from the UE to the network on the uplink DCCH logical channel.

```
-- ASN1START
-- TAG-UL-DCCH-MESSAGE-START
UL-DCCH-Message ::= SEQUENCE {
```

```
message
                                    UL-DCCH-MessageType
UL-DCCH-MessageType ::=
                                CHOICE {
                                    CHOICE {
        measurementReport
                                        MeasurementReport,
        rrcReconfigurationComplete
                                        RRCReconfigurationComplete,
        rrcSetupComplete
                                        RRCSetupComplete,
        rrcReestablishmentComplete
                                        RRCReestablishmentComplete,
        rrcResumeComplete
                                        RRCResumeComplete,
        securityModeComplete
                                        SecurityModeComplete,
        securityModeFailure
                                        SecurityModeFailure,
       ulInformationTransfer
                                        ULInformationTransfer,
        locationMeasurementIndication
                                        LocationMeasurementIndication.
       ueCapabilityInformation
                                        UECapabilityInformation,
        counterCheckResponse
                                        CounterCheckResponse,
       ueAssistanceInformation
                                        UEAssistanceInformation,
        failureInformation
                                        FailureInformation,
       ulInformationTransferMRDC
                                        ULInformationTransferMRDC,
                                        SCGFailureInformation,
        scgFailureInformation
        scgFailureInformationEUTRA
                                        SCGFailureInformationEUTRA
   messageClassExtension
                                    CHOICE {
        c2
                                        CHOICE {
            ulDedicatedMessageSegment-r16
                                             ULDedicatedMessageSegment-r16,
            dedicatedSIBRequest-r16
                                            DedicatedSIBRequest-r16,
            mcgFailureInformation-r16
                                            MCGFailureInformation-r16,
           ueInformationResponse-r16
                                            UEInformationResponse-r16,
            sidelinkUEInformationNR-r16
                                            SidelinkUEInformationNR-r16,
            ulInformationTransferIRAT-r16
                                            ULInformationTransferIRAT-r16,
            iabOtherInformation-r16
                                            IABOtherInformation-r16,
            mbsInterestIndication-r17
                                            MBSInterestIndication-r17,
           uePositioningAssistanceInfo-r17 UEPositioningAssistanceInfo-r17,
            measurementReportAppLayer-r17
                                            MeasurementReportAppLayer-r17,
                                            spare6 NULL, spare5 NULL, spare4 NULL, spare3 NULL, spare2 NULL, spare1 NULL
        messageClassExtensionFuture-r16
                                           SEQUENCE {}
-- TAG-UL-DCCH-MESSAGE-STOP
-- ASN1STOP
```

6.2.2 Message definitions

CounterCheck

The *CounterCheck* message is used by the network to indicate the current COUNT MSB values associated to each DRB and to request the UE to compare these to its COUNT MSB values and to report the comparison results to the network.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

CounterCheck message

```
-- ASN1START
-- TAG-COUNTERCHECK-START
CounterCheck ::=
                               SEQUENCE {
   rrc-TransactionIdentifier
                               RRC-TransactionIdentifier,
   criticalExtensions CHOI counterCheck
                                   CHOICE {
                                       CounterCheck-IEs,
       criticalExtensionsFuture
                                       SEQUENCE {}
CounterCheck-IEs ::=
                               SEOUENCE {
    drb-CountMSB-InfoList
                                   DRB-CountMSB-InfoList,
   lateNonCriticalExtension
                                   OCTET STRING
                                                                       OPTIONAL,
    nonCriticalExtension
                                   SEQUENCE {}
                                                                       OPTIONAL
DRB-CountMSB-InfoList ::=
                               SEQUENCE (SIZE (1..maxDRB)) OF DRB-CountMSB-Info
DRB-CountMSB-Info ::=
                               SEQUENCE {
   drb-Identity
                                   DRB-Identity,
    countMSB-Uplink
                                   INTEGER (0..33554431),
    countMSB-Downlink
                                   INTEGER(0..33554431)
-- TAG-COUNTERCHECK-STOP
-- ASN1STOP
```

CounterCheck-IEs field descriptions

drb-CountMSB-InfoList

Indicates the MSBs of the COUNT values of the DRBs.

DRB-CountMSB-Info field descriptions

countMSB-Downlink

Indicates the value of 25 MSBs from RX_NEXT - 1 (specified in TS 38.323 [5]) associated to this DRB.

countMSB-Uplink

Indicates the value of 25 MSBs from TX_NEXT - 1 (specified in TS 38.323 [5]) associated to this DRB.

CounterCheckResponse

The CounterCheckResponse message is used by the UE to respond to a CounterCheck message.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

CounterCheckResponse message

```
-- ASN1START
-- TAG-COUNTERCHECKRESPONSE-START
CounterCheckResponse ::=
                               SEOUENCE {
   rrc-TransactionIdentifier
                                   RRC-TransactionIdentifier,
    criticalExtensions
                                   CHOICE {
       counterCheckResponse
                                       CounterCheckResponse-IEs,
       criticalExtensionsFuture
                                       SEQUENCE {}
CounterCheckResponse-IEs ::=
                             SEQUENCE {
    drb-CountInfoList
                                   DRB-CountInfoList,
    lateNonCriticalExtension
                                   OCTET STRING
                                                                       OPTIONAL,
    nonCriticalExtension
                                   SEQUENCE {}
                                                                       OPTIONAL
DRB-CountInfoList ::=
                               SEQUENCE (SIZE (0..maxDRB)) OF DRB-CountInfo
DRB-CountInfo ::=
                               SEQUENCE {
   drb-Identity
                                   DRB-Identity,
    count-Uplink
                                   INTEGER (0..4294967295),
```

```
count-Downlink INTEGER(0..4294967295)
}
-- TAG-COUNTERCHECKRESPONSE-STOP
-- ASN1STOP
```

CounterCheckResponse-IEs field descriptions

drb-CountInfoList

Indicates the COUNT values of the DRBs.

DRB-CountInfo field descriptions

count-Downlink

Indicates the value of RX_NEXT - 1 (specified in TS 38.323 [5]) associated to this DRB.

count-Uplink

Indicates the value of TX_NEXT – 1 (specified in TS 38.323 [5]) associated to this DRB.

DedicatedSIBRequest

The DedicatedSIBRequest message is used to request SIB(s) required by the UE in RRC_CONNECTED as specified in clause 5.2.2.3.5.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

DedicatedSIBRequest message

```
-- ASN1START
-- TAG-DEDICATEDSIBREQUEST-START
DedicatedSIBRequest-r16 ::=
                                 SEQUENCE {
    criticalExtensions
       cicalExtensions
dedicatedSIBRequest-r16
DedicatedSIB
SEQUENCE {}
                                        DedicatedSIBRequest-r16-IEs,
DedicatedSIBRequest-r16-IEs ::= SEQUENCE {
    onDemandSIB-RequestList-r16
                                     SEQUENCE {
       requestedSIB-List-r16
                                         SEQUENCE (SIZE (1..maxOnDemandSIB-r16)) OF SIB-ReqInfo-r16
                                                                                                                    OPTIONAL,
                                         SEQUENCE (SIZE (1..maxOnDemandPosSIB-r16)) OF PosSIB-ReqInfo-r16
                                                                                                                    OPTIONAL
    } OPTIONAL,
```

```
lateNonCriticalExtension
                                     OCTET STRING
                                                              OPTIONAL,
    nonCriticalExtension
                                     SEQUENCE {}
                                                              OPTIONAL
SIB-RegInfo-r16 ::=
                                      ENUMERATED { sib12, sib13, sib14, sib20-v1700, sib21-v1700, spare3, spare2, spare1 }
PosSIB-RegInfo-r16 ::=
                            SEQUENCE {
    gnss-id-r16
                                 GNSS-ID-r16
                                                              OPTIONAL,
    sbas-id-r16
                                 SBAS-ID-r16
                                                              OPTIONAL,
   posSibType-r16
                                 ENUMERATED { posSibType1-1, posSibType1-2, posSibType1-3, posSibType1-4, posSibType1-5, posSibType1-6,
                                              posSibType1-7, posSibType1-8, posSibType2-1, posSibType2-2, posSibType2-3, posSibType2-4,
                                              posSibType2-5, posSibType2-6, posSibType2-7, posSibType2-8, posSibType2-9, posSibType2-10,
                                              posSibType2-11, posSibType2-12, posSibType2-13, posSibType2-14, posSibType2-15,
                                              posSibType2-16, posSibType2-17, posSibType2-18, posSibType2-19, posSibType2-20,
                                              posSibType2-21, posSibType2-22, posSibType2-23, posSibType3-1, posSibType4-1,
                                              posSibType5-1, posSibType6-1, posSibType6-2, posSibType6-3,..., posSibType1-9-v1710,
                                              posSibType1-10-v1710, posSibType2-24-v1710, posSibType2-25-v1710,
                                              posSibType6-4-v1710, posSibType6-5-v1710, posSibType6-6-v1710 }
-- TAG-DEDICATEDSIBREOUEST-STOP
-- ASN1STOP
```

DedicatedSIBRequest field descriptions

requestedSIB-List

Contains a list of SIB(s) the UE requests while in RRC_CONNECTED.

requestedPosSIB-List

Contains a list of posSIB(s) the UE requests while in RRC_CONNECTED.

PosSIB-RegInfo field descriptions

gnss-id

The presence of this field indicates that the request positioning SIB type is for a specific GNSS. Indicates a specific GNSS (see also TS 37.355 [49]) **sbas-id**

The presence of this field indicates that the request positioning SIB type is for a specific SBAS. Indicates a specific SBAS (see also TS 37.355 [49]).

DLDedicatedMessageSegment

The DLDedicatedMessageSegment message is used to transfer one segment of the RRCResume or RRCReconfiguration messages.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

DLDedicatedMessageSegment message

```
-- ASN1START
-- TAG-DLDEDICATEDMESSAGESEGMENT-START
DLDedicatedMessageSegment-r16 ::=
                                          SEQUENCE {
                                              CHOICE {
    criticalExtensions
        dlDedicatedMessageSegment-r16
                                                   DLDedicatedMessageSegment-r16-IEs,
        criticalExtensionsFuture
                                                   SEOUENCE {}
DLDedicatedMessageSegment-r16-IEs ::= SEQUENCE {
                                              INTEGER(0..4),
    segmentNumber-r16
   rrc-MessageSegmentContainer-r16
rrc-MessageSegmentType-r16
lateNonCriticalExtension
                                               OCTET STRING,
                                              ENUMERATED {notLastSegment, lastSegment},
                                              OCTET STRING
                                                                                                OPTIONAL,
    nonCriticalExtension
                                              SEQUENCE {}
                                                                                                OPTIONAL
-- TAG-DLDEDICATEDMESSAGESEGMENT-STOP
-- ASN1STOP
```

DLDedicatedMessageSegment field descriptions

segmentNumber

Identifies the sequence number of a segment within the encoded DL DCCH message. The network transmits the segments with continuously increasing segmentNumber order so that the UE's RRC layer may expect to obtain them from lower layers in the correct order. Hence, the UE is not required to perform segment re-ordering on RRC level.

rrc-MessageSegmentContainer

Includes a segment of the encoded DL DCCH message. The size of the included segment in this container should be small enough so the resulting encoded RRC message PDU is less than or equal to the PDCP SDU size limit.

rrc-MessageSegmentType

Indicates whether the included DL DCCH message segment is the last segment of the message or not.

DLInformationTransfer

The *DLInformationTransfer* message is used for the downlink transfer of NAS dedicated information, timing information for the 5G internal system clock, or IAB-DU specific F1-C related information.

Signalling radio bearer: SRB2 or SRB1 (only if SRB2 not established yet. If SRB2 is suspended, the network does not send this message until SRB2 is resumed. If only *dedicatedInfoF1c* is included, SRB2 is used).

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

DLInformationTransfer message

```
-- ASN1START
-- TAG-DLINFORMATIONTRANSFER-START
DLInformationTransfer ::=
   rrc-TransactionIdentifier
                                  RRC-TransactionIdentifier,
    criticalExtensions
                                       CHOICE {
       dlInformationTransfer DLInformationTraccriticalExtensionsFuture SEQUENCE {}
                                       DLInformationTransfer-IEs,
DLInformationTransfer-IEs ::=
                                   SEOUENCE {
    dedicatedNAS-Message
                                      DedicatedNAS-Message
                                                                          OPTIONAL,
                                                                                     -- Need N
    lateNonCriticalExtension
                                       OCTET STRING
                                                                          OPTIONAL,
    nonCriticalExtension
                                       DLInformationTransfer-v1610-IEs
                                                                          OPTIONAL
DLInformationTransfer-v1610-IEs ::= SEOUENCE {
   referenceTimeInfo-r16 ReferenceTimeInfo-r16 renCriticalExtension PLInformationTransfor
                                                                          OPTIONAL,
                                                                                    -- Need N
    nonCriticalExtension
                                       DLInformationTransfer-v1700-IEs
                                                                          OPTIONAL
DLInformationTransfer-v1700-IEs ::= SEQUENCE {
    dedicatedInfoF1c-r17
                                       DedicatedInfoF1c-r17
                                                                          OPTIONAL, -- Need N
                                       RxTxTimeDiff-r17
                                                                          OPTIONAL, -- Need N
    rxTxTimeDiff-qNB-r17
    ta-PDC-r17
                                      ENUMERATED {activate, deactivate} OPTIONAL, -- Need N
                                                                          OPTIONAL, -- Need N
    sib9Fallback-r17
                                       ENUMERATED {true}
    nonCriticalExtension
                                       SEQUENCE {}
                                                                          OPTIONAL
-- TAG-DLINFORMATIONTRANSFER-STOP
-- ASN1STOP
```

DLInformationTransfer field descriptions

rxTxTimeDiff-qNB

Indicates the Rx-Tx time difference measurement at the gNB (see clause 5.2.3, TS 38.215 [9]). Upon receiving this field, the UE calculates the propagation delay based on the RTT-based PDC mechanism method as described in TS 38.300 [2]. The network does not configure this field, if the UE is configured with *ta-PDC* with value *activate*.

sib9Fallback

Indicates that the UE fallbacks to receive reference TimeInfo in SIB9.

ta-PDC

Indicates whether the UE-side TA-based propagation delay compensation (PDC) is activated or de-activated. The network does not configure this field with activate, if the field rxTxTimeDiff-gNB is configured.

DLInformationTransferMRDC

The DLInformationTransferMRDC message is used for the downlink transfer of RRC messages during fast MCG link recovery.

Signalling radio bearer: SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

DLInformationTransferMRDC message

```
-- ASN1START
-- TAG-DLINFORMATIONTRANSFERMRDC-START
DLInformationTransferMRDC-r16 ::=
                                       SEOUENCE {
    criticalExtensions
                                           CHOICE {
       c1
                                               CHOICE {
           dlInformationTransferMRDC-r16
                                                   DLInformationTransferMRDC-r16-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                               SEQUENCE {}
DLInformationTransferMRDC-r16-IEs::= SEQUENCE {
    dl-DCCH-MessageNR-r16 OCTET STRING
                                                                   OPTIONAL, -- Need N
   dl-DCCH-MessageEUTRA-r16
lateNonCriticalExtension
                                          OCTET STRING
                                                                   OPTIONAL, -- Need N
                                          OCTET STRING
                                                                   OPTIONAL,
                                           SEQUENCE {}
                                                                   OPTIONAL
-- TAG-DLINFORMATIONTRANSFERMRDC-STOP
-- ASN1STOP
```

DLInformationTransferMRDC field descriptions

dl-DCCH-MessageNR

Includes the *DL-DCCH-Message*. In this version of the specification, the field is only used to transfer the NR *RRCReconfiguration*, *RRCRelease*, and *MobilityFromNRCommand* messages.

dI-DCCH-MessageEUTRA

Includes the *DL-DCCH-Message*. In this version of the specification, the field is only used to transfer the E-UTRA *RRCConnectionReconfiguration*, *RRCConnectionRelease*, and *MobilityFromEUTRACommand* messages as specified in TS 36.331 [10].

FailureInformation

The FailureInformation message is used to inform the network about a failure detected by the UE.

Signalling radio bearer: SRB1 or SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to network

FailureInformation message

```
-- ASN1START
-- TAG-FAILUREINFORMATION-START
FailureInformation ::=
                               SEQUENCE {
    criticalExtensions
                                   CHOICE {
                                       FailureInformation-IEs,
        failureInformation
                                      SEQUENCE {}
        criticalExtensionsFuture
FailureInformation-IEs ::=
                               SEQUENCE {
    failureInfoRLC-Bearer
                                  FailureInfoRLC-Bearer
                                                                OPTIONAL,
   lateNonCriticalExtension
                                  OCTET STRING
                                                                OPTIONAL,
    nonCriticalExtension
                                  FailureInformation-v1610-IEs OPTIONAL
FailureInfoRLC-Bearer ::=
                               SEQUENCE {
                                   CellGroupId,
    cellGroupId
    logicalChannelIdentity
                                   LogicalChannelIdentity,
    failureType
                                   ENUMERATED {rlc-failure, spare3, spare2, spare1}
FailureInformation-v1610-IEs ::= SEQUENCE {
                                     FailureInfoDAPS-r16
    failureInfoDAPS-r16
                                                                OPTIONAL,
                                    SEQUENCE {}
    nonCriticalExtension
                                                                OPTIONAL
FailureInfoDAPS-r16 ::=
                                 SEQUENCE {
                                     ENUMERATED {daps-failure, spare3, spare2, spare1}
    failureType-r16
-- TAG-FAILUREINFORMATION-STOP
-- ASN1STOP
```

IABOtherInformation

The IABOtherInformation message is used by IAB-MT to request the network to allocate IP addresses for the collocated IAB-DU or inform the network about IP addresses allocated to the collocated IAB-DU.

Signalling radio bearer: SRB1 or SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: IAB-MT to Network

IABOtherInformation message

```
-- ASN1START
-- TAG-IABOTHERINFORMATION-START
IABOtherInformation-r16 ::=
                                SEQUENCE {
    rrc-TransactionIdentifier
                                     RRC-TransactionIdentifier,
    criticalExtensions
                                     CHOICE {
                                         IABOtherInformation-r16-IEs,
        iabOtherInformation-r16
                                         SEQUENCE {}
        criticalExtensionsFuture
IABOtherInformation-r16-IEs ::=
                                         SEQUENCE {
    ip-InfoType-r16
                                             CHOICE {
        iab-IP-Request-r16
                                                 SEQUENCE {
            iab-IPv4-AddressNumReq-r16
                                                     IAB-IP-AddressNumReq-r16
                                                                                              OPTIONAL,
            iab-IPv6-AddressReg-r16
                                                     CHOICE {
                iab-IPv6-AddressNumReg-r16
                                                         IAB-IP-AddressNumReg-r16,
                iab-IPv6-AddressPrefixReq-r16
                                                         IAB-IP-AddressPrefixReg-r16,
                                                                                              OPTIONAL
        iab-IP-Report-r16
                                         SEOUENCE
            iab-IPv4-AddressReport-r16
                                             IAB-IP-AddressAndTraffic-r16
                                                                                              OPTIONAL,
            iab-IPv6-Report-r16
                iab-IPv6-AddressReport-r16
                                                 IAB-IP-AddressAndTraffic-r16,
                iab-IPv6-PrefixReport-r16
                                                 IAB-IP-PrefixAndTraffic-r16,
                                                                                              OPTIONAL
    lateNonCriticalExtension
                                     OCTET STRING
                                                                                              OPTIONAL,
    nonCriticalExtension
                                     SEQUENCE {}
                                                                                              OPTIONAL
IAB-IP-AddressNumReg-r16 ::=
                                SEQUENCE {
    all-Traffic-NumReq-r16
                                     INTEGER (1..8)
                                                                                      OPTIONAL,
    f1-C-Traffic-NumReq-r16
                                     INTEGER (1..8)
                                                                                      OPTIONAL,
    f1-U-Traffic-NumReq-r16
                                    INTEGER (1..8)
                                                                                      OPTIONAL,
    non-F1-Traffic-NumReq-r16
                                    INTEGER (1..8)
                                                                                      OPTIONAL,
```

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```
IAB-IP-AddressPrefixReg-r16 ::= SEQUENCE {
   all-Traffic-PrefixReg-r16
                                  ENUMERATED {true}
                                                                                 OPTIONAL.
   f1-C-Traffic-PrefixReq-r16
f1-U-Traffic-PrefixReq-r16
                                  ENUMERATED {true}
                                                                                 OPTIONAL.
                                  ENUMERATED {true}
                                                                                 OPTIONAL.
   OPTIONAL.
IAB-IP-AddressAndTraffic-r16 ::= SEQUENCE {
   all-Traffic-IAB-IP-Address-r16 SEOUENCE (SIZE(1..8)) OF IAB-IP-Address-r16
                                                                                OPTIONAL.
    f1-C-Traffic-IP-Address-r16
                                  SEQUENCE (SIZE(1..8)) OF IAB-IP-Address-r16
                                                                                OPTIONAL,
   f1-U-Traffic-IP-Address-r16
                                  SEQUENCE (SIZE(1..8)) OF IAB-IP-Address-r16
                                                                                OPTIONAL.
   non-F1-Traffic-IP-Address-r16 SEOUENCE (SIZE(1..8)) OF IAB-IP-Address-r16
                                                                                OPTIONAL
IAB-IP-PrefixAndTraffic-r16 ::= SEQUENCE {
   all-Traffic-IAB-IP-Address-r16 IAB-IP-Address-r16
                                                                                 OPTIONAL,
                                  IAB-IP-Address-r16
    f1-C-Traffic-IP-Address-r16
                                                                                 OPTIONAL,
   f1-U-Traffic-IP-Address-r16 IAB-IP-Address-r16
                                                                                 OPTIONAL,
   non-F1-Traffic-IP-Address-r16 IAB-IP-Address-r16
                                                                                 OPTIONAL
-- TAG-IABOTHERINFORMATION-STOP
-- ASN1STOP
```

IABOtherInformation-IEs field descriptions

iab-IPv4-AddressNumReg

This field is used to request the numbers of IPv4 address per specific usage. The specific usages include F1-C traffic, F1-U traffic, non-F1 traffic and all traffic.

iab-IPv4-AddressReport

This field is used to report the IPv4 address per specific usage assigned by OAM for IAB-DU. The specific usages include F1-C traffic, F1-U traffic, non-F1 traffic and all traffic.

iab-IPv6-AddressNumRea

This field is used to request the numbers of IPv6 address per specific usage. The specific usages include F1-C traffic, F1-U traffic, non-F1 traffic and all traffic.

iab-IPv6-AddressPrefixRea

This field is used to request the prefix of IPv6 address per specific usage. The specific usages include F1-C traffic, F1-U traffic, non-F1 traffic and all traffic.

iab-IPv6-AddressReport

This field is used to report the IPv6 address per specific usage assigned by OAM for IAB-DU. The specific usages include F1-C traffic, F1-U traffic, non-F1 traffic and all traffic.

iab-IPv6-PrefixReport

This field is used to report the prefix of IPv6 address per specific usage assigned by OAM for IAB-DU. The specific usages include F1-C traffic, F1-U traffic, non-F1 traffic and all traffic.

IAB-IP-AddressNumReg-IEs field descriptions

all-Traffic-NumReq

This field is used to request the numbers of IP address for all traffic.

f1-C-Traffic-NumReq

This field is used to request the numbers of IP address for F1-C traffic.

f1-U-Traffic-NumReq

This field is used to request the numbers of IP address for F1-U traffic.

non-F1-Traffic-NumReg

This field is used to request the numbers of IP address for non-F1 traffic.

IAB-IP-AddressPrefixReq-IEs field descriptions

all-Traffic-PrefixReq

This field is used to request the IPv6 address prefix for all traffic. The length of allocated IPv6 prefix is fixed to 64.

f1-C-Traffic-PrefixReq

This field is used to request the IPv6 address prefix for F1-C traffic. The length of allocated IPv6 prefix is fixed to 64.

f1-U-Traffic-PrefixReg

This field is used to request the IPv6 address prefix for F1-U traffic. The length of allocated IPv6 prefix is fixed to 64.

non-F1-Traffic-PrefixReq

This field is used to request the IPv6 address prefix for non-F1 traffic. The length of allocated IPv6 prefix is fixed to 64.

IAB-IP-AddressAndTraffic-IEs field descriptions

all-Traffic-IAB-IP-Address

This field is used to report to IAB-donor-CU the IP address(es) or IPv6 address prefix for all traffic.

f1-C-Traffic-IP-Address

This field is used to report to IAB-donor-CU the IP address(es) or IPv6 address prefix for F1-C traffic.

f1-U-Traffic-IP-Address

This field is used to report to IAB-donor-CU the IP address(es) or IPv6 address prefix for F1-U traffic.

non-F1-Traffic-IP-Address

This field is used to report to IAB-donor-CU the IP address(es) or IPv6 address prefix for non-F1 traffic.

LocationMeasurementIndication

The LocationMeasurementIndication message is used to indicate that the UE is going to either start or stop location related measurement which requires measurement gaps.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

LocationMeasurementIndication message

```
-- ASN1START
-- TAG-LOCATIONMEASUREMENTINDICATION-START
LocationMeasurementIndication ::=
                                         SEOUENCE {
                                        CHOICE {
   criticalExtensions
       locationMeasurementIndication criticalExtensionsFuture
                                             LocationMeasurementIndication-IEs,
                                                 SEQUENCE {}
LocationMeasurementIndication-IEs ::= SEQUENCE {
                                             SetupRelease {LocationMeasurementInfo},
   measurementIndication
   lateNonCriticalExtension
                                             OCTET STRING
                                                                                                                  OPTIONAL,
   nonCriticalExtension
                                             SEQUENCE { }
                                                                                                                  OPTIONAL
-- TAG-LOCATIONMEASUREMENTINDICATION-STOP
```

LoggedMeasurementConfiguration

The LoggedMeasurementConfiguration message is used to perform logging of measurement results while in RRC_IDLE or RRC_INACTIVE. It is used to transfer the logged measurement configuration for network performance optimisation.

Signalling radio bearer: SRB1

RLC-SAP: AM

-- ASN1STOP

Logical channel: DCCH

Direction: Network to UE

${\it Logged Measure ment Configuration\ message}$

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```
tce-Id-r16
                                                OCTET STRING (SIZE (1)),
    absoluteTimeInfo-r16
                                                AbsoluteTimeInfo-r16.
                                                AreaConfiguration-r16
    areaConfiguration-r16
                                                                                          OPTIONAL. --Need R
                                                PLMN-IdentityList2-r16
    plmn-IdentityList-r16
                                                                                          OPTIONAL, --Need R
                                                                                          OPTIONAL, --Need M
    bt-NameList-r16
                                                SetupRelease {BT-NameList-r16}
    wlan-NameList-r16
                                                SetupRelease {WLAN-NameList-r16}
                                                                                          OPTIONAL, --Need M
    sensor-NameList-r16
                                                SetupRelease {Sensor-NameList-r16}
                                                                                          OPTIONAL, --Need M
                                                LoggingDuration-r16,
    loggingDuration-r16
    reportType
                                                CHOICE {
       periodical
                                                    LoggedPeriodicalReportConfig-r16,
        eventTriggered
                                                    LoggedEventTriggerConfig-r16,
    lateNonCriticalExtension
                                                OCTET STRING
                                                                                          OPTIONAL.
    nonCriticalExtension
                                                LoggedMeasurementConfiguration-v1700-IEs OPTIONAL
LoggedMeasurementConfiguration-v1700-IEs ::= SEQUENCE {
    sigLoggedMeasType-r17
                                                ENUMERATED {true}
                                                                                          OPTIONAL, -- Need R
                                                ENUMERATED {true}
    earlyMeasIndication-r17
                                                                                          OPTIONAL, -- Need R
    areaConfiguration-v1700
                                                AreaConfiguration-v1700
                                                                                          OPTIONAL, --Need R
    nonCriticalExtension
                                                SEQUENCE {}
                                                                                          OPTIONAL
LoggedPeriodicalReportConfig-r16 ::=
                                                SEOUENCE {
    loggingInterval-r16
                                                     LoggingInterval-r16,
    . . .
LoggedEventTriggerConfig-r16 ::=
                                                SEOUENCE {
    eventType-r16
                                                     EventType-r16,
    loggingInterval-r16
                                                    LoggingInterval-r16,
    . . .
EventType-r16 ::= CHOICE {
    outOfCoverage
                      NULL,
    eventL1
                      SEOUENCE {
       11-Threshold
                          MeasTriggerQuantity,
       hysteresis
                          Hysteresis,
        timeToTrigger
                          TimeToTrigger
-- TAG-LOGGEDMEASUREMENTCONFIGURATION-STOP
-- ASN1STOP
```

LoggedMeasurementConfiguration field descriptions

absoluteTimeInfo

Indicates the absolute time in the current cell.

areaConfiguration

Used to restrict the area in which the UE performs measurement logging to cells broadcasting either one of the included cell identities or one of the included tracking area codes/ frequencies.

earlyMeasIndication

If included, the field indicates the UE is allowed to log measurements on early measurement related frequencies in logged measurements.

eventType

The value outOfCoverage indicates the UE to perform logging of measurements when the UE enters any cell selection state, and the value eventL1 indicates the UE to perform logging of measurements when the triggering condition (similar as event A2 as specified in 5.5.4.3) as configured in the event is met for the camping cell in camped normally state.

plmn-IdentityList

Indicates a set of PLMNs defining when the UE performs measurement logging as well as the associated status indication and information retrieval i.e. the UE performs these actions when the RPLMN is part of this set of PLMNs.

sigLoggedMeasType

If included, the field indicates a signalling based logged measurements (See TS 37.320 [61]).

tce-ld

Parameter Trace Collection Entity Id: See TS 32.422 [52].

traceRecordingSessionRef

Parameter Trace Recording Session Reference: See TS 32.422 [52].

reportType

Parameter configures the type of MDT configuration, specifically Periodic MDT configuration or Event Triggerd MDT configuration.

MBSBroadcastConfiguration

The MBSBroadcastConfiguration message contains the control information applicable for MBS broadcast services transmitted via broadcast MRB.

Signalling radio bearer: N/A

RLC-SAP: UM

Logical channel: MCCH

Direction: Network to UE

MBSBroadcastConfiguration message

MBSBroadcastConfiguration field descriptions

pdsch-ConfigMTCH

-- ASN1STOP

Provides parameters for acquiring the PDSCH for MTCH. When this field is absent, the UE shall use parameters in pdsch-ConfigMCCH to acquire the PDSCH for MTCH.

mbs-SessionInfoList

Provides the configuration of each MBS session provided by MBS broadcast in the current cell.

mbs-NeighbourCellList

List of neighbour cells providing MBS broadcast services via broadcast MRB. This field is used by the UE together with *mtch-NeighbourCell* field signalled for each MBS session in the corresponding *MBS-SessionInfo*. When an empty *mbs-NeighbourCellList* list is signalled, the UE shall assume that MBS broadcast services signalled in *mbs-SessionInfoList* in the *MBSBroadcastConfiguration* message are not provided in any neighbour cell. When the field *mbs-NeighbourCellList* is absent, the current serving cell does not provide information about MBS broadcast services in the neighbouring cells, i.e. the UE cannot determine the presence or absence of an MBS service in neighbouring cells based on the absence of this field.

MBSInterestIndication

The MBSInterestIndication message is used to inform network that the UE is receiving/ interested to receive or no longer receiving/ interested to receive MBS broadcast service(s) via a broadcast MRB.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

MBSInterestIndication message

```
-- ASN1START
-- TAG-MBSINTERESTINDICATION-START

MBSInterestIndication-r17 ::= SEQUENCE {
    criticalExtensions CHOICE {
```

```
mbsInterestIndication-r17
                                     MBSInterestIndication-r17-IEs,
       criticalExtensionsFuture
                                     SEOUENCE {}
MBSInterestIndication-r17-IEs ::= SEQUENCE {
    mbs-FregList-r17
                                     CarrierFreqListMBS-r17
                                                                         OPTIONAL,
   mbs-Priority-r17
                                     ENUMERATED {true}
                                                                         OPTIONAL,
   mbs-ServiceList-r17
                                    MBS-ServiceList-r17
                                                                         OPTIONAL,
   lateNonCriticalExtension
                                     OCTET STRING
                                                                         OPTIONAL,
    nonCriticalExtension
                                     SEQUENCE {}
                                                                         OPTIONAL
-- TAG-MBSINTERESTINDICATION-STOP
-- ASN1STOP
```

MBSInterestIndication field descriptions

mbs-FreqList

List of MBS frequencies on which the UE is receiving or interested to receive MBS broadcast service via a broadcast MRB.

mbs-Priority

Indicates whether the UE prioritises MBS broadcast reception above unicast and MBS multicast reception. The field is present (i.e. value *true*), if the UE prioritises reception of broadcast services, on frequencies indicated in *mbs-FreqLis*t, above a reception of any of the unicast bearers and multicast MRBs. Otherwise the field is absent.

mbs-ServiceList

List of MBS broadcast services which the UE is receiving or interested to receive.

MCGFailureInformation

The MCGFailureInformation message is used to provide information regarding NR MCG failures detected by the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

MCGFailureInformation message

```
MCGFailureInformation-r16-IEs ::= SEOUENCE {
    failureReportMCG-r16
                                      FailureReportMCG-r16
                                                                                        OPTIONAL.
    lateNonCriticalExtension
                                      OCTET STRING
                                                                                        OPTIONAL,
    nonCriticalExtension
                                      SEQUENCE {}
                                                                                        OPTIONAL
FailureReportMCG-r16 ::=
                                  SEOUENCE {
    failureType-r16
                                      ENUMERATED {t310-Expiry, randomAccessProblem, rlc-MaxNumRetx,
                                                         t312-Expiry-r16, lbt-Failure-r16, beamFailureRecoveryFailure-r16,
                                         bh-RLF-r16, spare1}
                                                                                                                                         OPTIONAL.
    measResultFreqList-r16
                                      MeasResultList2NR
                                                                                                                             OPTIONAL,
    measResultFreqListEUTRA-r16
                                      MeasResultList2EUTRA
                                                                                                                             OPTIONAL,
    measResultSCG-r16
                                      OCTET STRING (CONTAINING MeasResultSCG-Failure)
                                                                                                                             OPTIONAL,
    measResultSCG-EUTRA-r16
                                      OCTET STRING
                                                                                                                             OPTIONAL,
    measResultFreqListUTRA-FDD-r16
                                     MeasResultList2UTRA
                                                                                                                             OPTIONAL,
MeasResultList2UTRA ::=
                           SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2UTRA-FDD-r16
MeasResult2UTRA-FDD-r16 ::=
                                  SEOUENCE {
    carrierFreg-r16
                                      ARFCN-ValueUTRA-FDD-r16,
    measResultNeighCellList-r16
                                      MeasResultListUTRA-FDD-r16
MeasResultList2EUTRA ::=
                                  SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-r16
-- TAG-MCGFAILUREINFORMATION-STOP
-- ASN1STOP
```

MCGFailureInformation field descriptions

measResultFreqList

The field contains available results of measurements on NR frequencies the UE is configured to measure by the measConfig associated with the MCG.

measResultFreqListEUTRA

The field contains available results of measurements on E-UTRA frequencies the UE is configured to measure by measConfig associated with the MCG.

measResultFreqListUTRA-FDD

The field contains available results of measurements on UTRA FDD frequencies the UE is configured to measure by measConfig associated with the MCG.

measResultSCG

The field contains the MeasResultSCG-Failure IE which includes available measurement results on NR frequencies the UE is configured to measure by the measConfig associated with the SCG.

measResultSCG-EUTRA

The field contains the EUTRA MeasResultSCG-FailureMRDC IE which includes available results of measurements on E-UTRA frequencies the UE is configured to measure by the E-UTRA RRCConnectionReconfiguration message as specified in TS 36.331 [10].

MeasurementReport

The *MeasurementReport* message is used for the indication of measurement results.

Signalling radio bearer: SRB1, SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

MeasurementReport message

```
-- ASN1START
-- TAG-MEASUREMENTREPORT-START
                                     SEQUENCE {
MeasurementReport ::=
       ticalExtensions CH0
measurementReport
criticalExtensionsFuture
    criticalExtensions
                                   CHOICE {
                                              MeasurementReport-IEs,
                                              SEQUENCE {}
                                     SEQUENCE {
MeasurementReport-IEs ::=
    measResults
                                          MeasResults,
    lateNonCriticalExtension
                                              OCTET STRING
    nonCriticalExtension
                                              SEQUENCE { }
-- TAG-MEASUREMENTREPORT-STOP
-- ASN1STOP
```

OPTIONAL, OPTIONAL

MeasurementReportAppLayer

The MeasurementReportAppLayer message is used for sending application layer measurement report.

Signalling radio bearer: SRB4

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

MeasurementReportAppLayer message

```
-- ASN1START
-- TAG-MEASUREMENTREPORTAPPLAYER-START
MeasurementReportAppLayer-r17 ::=
                                      SEOUENCE {
    criticalExtensions
                                          CHOICE {
       measurementReportAppLayer-r17
                                          MeasurementReportAppLayer-r17-IEs,
       criticalExtensionsFuture
                                              SEOUENCE {}
MeasurementReportAppLayer-r17-IEs ::= SEQUENCE {
    measurementReportAppLayerList-r17
                                            MeasurementReportAppLayerList-r17,
   lateNonCriticalExtension
                                            OCTET STRING
                                                                                                                    OPTIONAL,
    nonCriticalExtension
                                            SEQUENCE { }
                                                                                                                    OPTIONAL
MeasurementReportAppLayerList-r17 ::= SEQUENCE (SIZE (1..maxNrofAppLayerMeas-r17)) OF MeasReportAppLayer-r17
                                  SEOUENCE {
MeasReportAppLayer-r17 ::=
    measConfigAppLayerId-r17
                                          MeasConfigAppLayerId-r17,
    measReportAppLayerContainer-r17
                                          OCTET STRING
                                                                                                                    OPTIONAL,
    appLayerSessionStatus-r17
                                          ENUMERATED {started, stopped}
                                                                                                                    OPTIONAL,
    ran-VisibleMeasurements-r17
                                          RAN-VisibleMeasurements-r17
                                                                                                                    OPTIONAL
RAN-VisibleMeasurements-r17 ::=
                                      SEOUENCE {
    appLayerBufferLevelList-r17
                                          SEQUENCE (SIZE (1..8)) OF AppLayerBufferLevel-r17
                                                                                                                    OPTIONAL,
    playoutDelayForMediaStartup-r17
                                          INTEGER (0..30000)
                                                                                                                    OPTIONAL,
   pdu-SessionIdList-r17
                                          SEQUENCE (SIZE (1..maxNrofPDU-Sessions-r17)) OF PDU-SessionID
                                                                                                                    OPTIONAL,
AppLayerBufferLevel-r17 ::= INTEGER (0..30000)
-- TAG-MEASUREMENTREPORTAPPLAYER-STOP
-- ASN1STOP
```

MeasReportAppLayer field descriptions

appLayerSessionStatus

Indicates that an application layer measurement session in the application layer starts or ends.

measReportAppLayerContainer

The field contains application layer measurement report, see Annex L (normative) in TS 26.247 [68], clause 16.5 in TS 26.114 [69] and TS 26.118 [70].

ran-VisibleMeasurements

The field contains the configuration of RAN visible application layer measurement parameters.

RAN-VisibleMeasurements field descriptions

appLayerBufferLevelList

The field indicates a list of application layer buffer levels, and each *AppLayerBufferLevel* indicates the application layer buffer level in ms. Value 0 corresponds to 0ms, value 1 corresponds to 10ms, value 2 corresponds to 20 ms and so on. If the buffer level is larger than the maximum value of 30000 (5 minutes), the UE reports 30000.

playoutDelayForMediaStartup

Indicates the application layer playout delay for media start-up in ms. Value 0 corresponds to 0ms, value 1 corresponds to 1ms, value 2 corresponds to 2 ms and so on. If the playout delay for media start-up is larger than the maximum value of 30000ms, the UE reports 30000.

pdu-SessionIdList

Contains the identity of the PDU session, or the identities of the PDU sessions, used for application data flows subject to the RAN visible application layer measurements.

- MIB

The MIB includes the system information transmitted on BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: BCCH

Direction: Network to UE

MIB

```
-- ASN1START
-- TAG-MIB-START
MIB ::=
                                    SEQUENCE {
                                        BIT STRING (SIZE (6)),
    systemFrameNumber
    subCarrierSpacingCommon
                                        ENUMERATED {scs15or60, scs30or120},
    ssb-SubcarrierOffset
                                        INTEGER (0..15),
    dmrs-TypeA-Position
                                        ENUMERATED {pos2, pos3},
                                        PDCCH-ConfigSIB1.
    pdcch-ConfigSIB1
                                        ENUMERATED {barred, notBarred},
    cellBarred
    intraFreqReselection
                                        ENUMERATED {allowed, notAllowed},
                                        BIT STRING (SIZE (1))
    spare
-- TAG-MIB-STOP
-- ASN1STOP
```

MIB field descriptions

cellBarred

Value barred means that the cell is barred, as defined in TS 38.304 [20]. This field is ignored by IAB-MT. This field is ignored for connectivity to NTN.

dmrs-TypeA-Position

Position of (first) DM-RS for downlink (see TS 38.211 [16], clause 7.4.1.1.2) and uplink (see TS 38.211 [16], clause 6.4.1.1.3).

intraFreqReselection

Controls cell selection/reselection to intra-frequency cells when the highest ranked cell is barred, or treated as barred by the UE, as specified in TS 38.304 [20]. This field is ignored by IAB-MT.

pdcch-ConfigSIB1

Determines a common *ControlResourceSet* (CORESET), a common search space and necessary PDCCH parameters. If the field *ssb-SubcarrierOffset* indicates that *SlB1* is absent, the field *pdcch-ConfigSlB1* indicates the frequency positions where the UE may find SS/PBCH block with *SlB1* or the frequency range where the network does not provide SS/PBCH block with *SlB1* (see TS 38.213 [13], clause 13).

ssb-SubcarrierOffset

Corresponds to k_{SSB} (see TS 38.213 [13]), which is the frequency domain offset between SSB and the overall resource block grid in number of subcarriers. (See TS 38.211 [16], clause 7.4.3.1). For operation with shared spectrum channel access in FR1 (see 37.213 [48]), this field corresponds to \bar{k}_{SSB} , and k_{SSB} is obtained from \bar{k}_{SSB} (see TS 38.211 [16], clause 7.4.3.1); the LSB of this field is used also for deriving the QCL relation between SS/PBCH blocks as specified in TS 38.213 [13], clause 4.1. The value range of this field may be extended by an additional most significant bit encoded within PBCH as specified in TS 38.213 [13].

This field may indicate that this cell does not provide *SIB1* and that there is hence no CORESET#0 configured in *MIB* (see TS 38.213 [13], clause 13). In this case, the field *pdcch-ConfigSIB1* may indicate the frequency positions where the UE may (not) find a SS/PBCH with a control resource set and search space for *SIB1* (see TS 38.213 [13], clause 13).

subCarrierSpacingCommon

Subcarrier spacing for *SIB1*, Msg.2/4 and MsgB for initial access, paging and broadcast SI-messages. If the UE acquires this *MIB* on an FR1 carrier frequency, the value *scs15or60* corresponds to 15 kHz and the value *scs30or120* corresponds to 30 kHz. If the UE acquires this *MIB* on an FR2 carrier frequency, the value *scs15or60* corresponds to 60 kHz and the value *scs30or120* corresponds to 120 kHz. For operation with shared spectrum channel access in FR1 (see 37.213 [48]) and for operation in FR2-2, the subcarrier spacing for *SIB1*, Msg.2/4 and MsgB for initial access, paging and broadcast SI-messages is same as that for the corresponding SSB. For operation with shared spectrum channel access, this field instead is used for deriving the QCL relation between SS/PBCH blocks as specified in TS 38.213 [13], clause 4.1.

systemFrameNumber

The 6 most significant bits (MSB) of the 10-bit System Frame Number (SFN). The 4 LSB of the SFN are conveyed in the PBCH transport block as part of channel coding (i.e. outside the *MIB* encoding), as defined in clause 7.1 in TS 38.212 [17].

MobilityFromNRCommand

The MobilityFromNRCommand message is used to command handover from NR to E-UTRA/EPC, E-UTRA/5GC or UTRA-FDD.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

MobilityFromNRCommand message

```
-- TAG-MOBILITYFROMNRCOMMAND-START
MobilityFromNRCommand ::=
                                   SEQUENCE {
   rrc-TransactionIdentifier
                                       RRC-TransactionIdentifier,
    criticalExtensions
                                       CHOICE {
                                           MobilityFromNRCommand-IEs,
           mobilityFromNRCommand
           criticalExtensionsFuture
                                           SEQUENCE {}
MobilityFromNRCommand-IEs ::=
                                   SEQUENCE {
                                       ENUMERATED { eutra, utra-fdd-v1610, spare2, spare1, ...},
    targetRAT-Type
    targetRAT-MessageContainer
                                       OCTET STRING.
    nas-SecurityParamFromNR
                                       OCTET STRING
                                                                                                               -- Cond HO-TOEPCUTRAN
                                                                                                    OPTIONAL,
   lateNonCriticalExtension
                                       OCTET STRING
                                                                                                    OPTIONAL,
    nonCriticalExtension
                                       MobilityFromNRCommand-v1610-IEs
                                                                                                    OPTIONAL
MobilityFromNRCommand-v1610-IEs ::=
                                       SEOUENCE {
                                           ENUMERATED {true}
    voiceFallbackIndication-r16
                                                                                                    OPTIONAL, -- Need N
    nonCriticalExtension
                                           SEQUENCE {}
                                                                                                    OPTIONAL
-- TAG-MOBILITYFROMNRCOMMAND-STOP
-- ASN1STOP
```

MobilityFromNRCommand-IEs field descriptions

nas-SecurityParamFromNR

If targetRAT-Type is eutra, this field is used to deliver the key synchronisation and Key freshness for the NR to LTE/EPC handovers and a part of the downlink NAS COUNT as specified in TS 33.501 [11]. If targetRAT-Type is utra-fdd, this field is used to deliver the key synchronisation and Key freshness for the NR to FDD UTRAN handover and a part of the downlink NAS COUNT as specified in TS 33.501 [11].

targetRAT-MessageContainer

The field contains a message specified in another standard, as indicated by the *targetRAT-Type*, and carries information about the target cell identifier(s) and radio parameters relevant for the target radio access technology. A complete message is included, as specified in the other standard. See NOTE 1

targetRAT-Type

Indicates the target RAT type.

voiceFallbackIndication

Indicates the handover is triggered by EPS fallback for IMS voice as specified in TS 23.502 [43].

NOTE 1: The correspondence between the value of the *targetRAT-Type*, the standard to apply, and the message contained within the *targetRAT-MessageContainer* is shown in the table below:

targetRAT-Type	Standard to apply	targetRAT-MessageContainer
eutra	TS 36.331 [10] (clause 5.4.2)	DL-DCCH-Message including the RRCConnectionReconfiguration
utra-fdd	TS 25.331 [45] (clause 10.2.16a)	Handover TO UTRAN command

Conditional Presence	Explanation	
HO-ToEPCUTRAN	This field is mandatory present in case of inter system handover to "EPC" or "FDD UTRAN". Otherwise it is absent.	

- Paging

The *Paging* message is used for the notification of one or more UEs.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: PCCH

Direction: Network to UE

Paging message

```
-- ASN1START
-- TAG-PAGING-START
Paging ::=
                                    SEQUENCE {
    pagingRecordList
                                        PagingRecordList
                                                                                                                 OPTIONAL, -- Need N
   lateNonCriticalExtension
                                        OCTET STRING
                                                                                                                 OPTIONAL,
    nonCriticalExtension
                                        Paging-v1700-IEs
                                                                                                                 OPTIONAL
Paging-v1700-IEs ::=
                                    SEQUENCE {
    pagingRecordList-v1700
                                        PagingRecordList-v1700
                                                                                                                 OPTIONAL, -- Need N
    pagingGroupList-r17
                                        PagingGroupList-r17
                                                                                                                 OPTIONAL, -- Need N
    nonCriticalExtension
                                        SEQUENCE {}
                                                                                                                 OPTIONAL
PagingRecordList ::=
                                    SEQUENCE (SIZE(1..maxNrofPageRec)) OF PagingRecord
PagingRecordList-v1700 ::=
                                    SEQUENCE (SIZE(1..maxNrofPageRec)) OF PagingRecord-v1700
PagingGroupList-r17 ::=
                                    SEQUENCE (SIZE(1..maxNrofPageGroup-r17)) OF TMGI-r17
PagingRecord ::=
                                    SEQUENCE {
                                        PagingUE-Identity,
    ue-Identity
                                        ENUMERATED {non3GPP}
    accessType
                                                                OPTIONAL, -- Need N
    . . .
PagingRecord-v1700 ::=
                                    SEQUENCE {
    pagingCause-r17
                                        ENUMERATED {voice}
                                                                OPTIONAL
                                                                            -- Need N
PagingUE-Identity ::=
                                    CHOICE {
```

```
ng-5G-S-TMSI NG-5G-S-TMSI, fullI-RNTI I-RNTI-Value, ...
}

-- TAG-PAGING-STOP
-- ASN1STOP
```

PagingRecord field descriptions

accessType

Indicates whether the Paging message is originated due to the PDU sessions from the non-3GPP access.

pagingRecordList

If the network includes pagingRecordList-v1700, it includes the same number of entries, and listed in the same order, as in pagingRecordList (i.e. without suffix).

pagingCause

Indicates whether the Paging message is originated due to IMS voice. If this field is present, it implies that the corresponding paging entry is for IMS voice. If upper layers indicate the support of paging cause and if this field is not present but pagingRecordList-v1700 is present, it implies that the corresponding paging entry is for a service other than IMS voice. Otherwise, paging cause is undetermined.

RRCReestablishment

The RRCReestablishment message is used to re-establish SRB1.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

RRCReestablishment message

```
-- ASN1START
-- TAG-RRCREESTABLISHMENT-START
RRCReestablishment ::=
                                   SEQUENCE {
   rrc-TransactionIdentifier
                                      RRC-TransactionIdentifier,
   criticalExtensions
rrcReestablishment
                                       CHOICE {
                                          RRCReestablishment-IEs,
       criticalExtensionsFuture
                                          SEQUENCE {}
RRCReestablishment-IEs ::=
                                   SEOUENCE {
    nextHopChainingCount
                                       NextHopChainingCount,
    lateNonCriticalExtension
                                       OCTET STRING
                                                                          OPTIONAL,
    nonCriticalExtension
                                       RRCReestablishment-v1700-IEs
                                                                           OPTIONAL
```

RRCReestablishment-IEs field descriptions

sI-L2RemoteUE-Config

Contains dedicated configurations used for L2 U2N relay related operation. The network configures only the SRAP configuration used for the SRB1 and local UE ID.

Conditional Presence	Explanation
L2RemoteUE	The field is mandatory present for L2 U2N Remote UE; otherwise it is absent.

RRCReestablishmentComplete

The RRCReestablishmentComplete message is used to confirm the successful completion of an RRC connection re-establishment.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

RRCReestablishmentComplete message

```
-- ASN1START
-- TAG-RRCREESTABLISHMENTCOMPLETE-START
RRCReestablishmentComplete ::=
                                            SEQUENCE {
   rrc-TransactionIdentifier
                                                RRC-TransactionIdentifier,
    criticalExtensions
                                                CHOICE {
                                                    RRCReestablishmentComplete-IEs,
       rrcReestablishmentComplete
       criticalExtensionsFuture
                                                    SEQUENCE {}
RRCReestablishmentComplete-IEs ::=
                                            SEOUENCE {
    lateNonCriticalExtension
                                                OCTET STRING
                                                                                        OPTIONAL,
                                                RRCReestablishmentComplete-v1610-IEs
    nonCriticalExtension
                                                                                        OPTIONAL
```

RRCReestablishmentRequest

The RRCReestablishmentRequest message is used to request the reestablishment of an RRC connection.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to Network

RRCReestablishmentRequest message

```
-- ASN1START
-- TAG-RRCREESTABLISHMENTREQUEST-START
RRCReestablishmentRequest ::=
                                    SEQUENCE {
    rrcReestablishmentRequest
                                        RRCReestablishmentRequest-IEs
RRCReestablishmentRequest-IEs ::= SEQUENCE
                                        ReestabUE-Identity,
    ue-Identity
    reestablishmentCause
                                        ReestablishmentCause,
    spare
                                        BIT STRING (SIZE (1))
ReestabUE-Identity ::=
                                    SEQUENCE {
    c-RNTI
                                        RNTI-Value,
   physCellId
                                        PhysCellId,
    shortMAC-I
                                        ShortMAC-I
ReestablishmentCause ::=
                                    ENUMERATED {reconfigurationFailure, handoverFailure, otherFailure, spare1}
-- TAG-RRCREESTABLISHMENTREQUEST-STOP
-- ASN1STOP
```

ReestabUE-Identity field descriptions

physCellId

The Physical Cell Identity of the PCell the UE was connected to prior to the failure.

RRCReestablishmentRequest-IEs field descriptions

reestablishmentCause

Indicates the failure cause that triggered the re-establishment procedure. gNB is not expected to reject a RRCReestablishmentRequest due to unknown cause value being used by the UE.

ue-Identity

UE identity included to retrieve UE context and to facilitate contention resolution by lower layers.

RRCReconfiguration

The *RRCReconfiguration* message is the command to modify an RRC connection. It may convey information for measurement configuration, mobility control, radio resource configuration (including RBs, MAC main configuration and physical channel configuration) and AS security configuration.

Signalling radio bearer: SRB1 or SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

RRCReconfiguration message

```
-- ASN1START
-- TAG-RRCRECONFIGURATION-START
RRCReconfiguration ::=
                                       SEQUENCE {
   rrc-TransactionIdentifier
                                           RRC-TransactionIdentifier,
    criticalExtensions
                                               RRCReconfiguration-IEs,
       rrcReconfiguration
                                               SEQUENCE {}
       criticalExtensionsFuture
RRCReconfiguration-IEs ::=
                                       SEOUENCE {
    radioBearerConfig
                                           RadioBearerConfig
                                                                                                                 OPTIONAL, -- Need M
    secondaryCellGroup
                                           OCTET STRING (CONTAINING CellGroupConfig)
                                                                                                                 OPTIONAL, -- Cond SCG
                                                                                                                 OPTIONAL, -- Need M
   measConfig
                                           MeasConfig
   lateNonCriticalExtension
                                           OCTET STRING
                                                                                                                 OPTIONAL,
    nonCriticalExtension
                                           RRCReconfiguration-v1530-IEs
                                                                                                                 OPTIONAL
RRCReconfiguration-v1530-IEs ::=
                                           SEQUENCE {
    masterCellGroup
                                           OCTET STRING (CONTAINING CellGroupConfig)
                                                                                                                 OPTIONAL, -- Need M
```

```
ENUMERATED {true}
                                                                                                                    OPTIONAL, -- Cond FullConfig
    fullConfig
    dedicatedNAS-MessageList
                                            SEQUENCE (SIZE(1..maxDRB)) OF DedicatedNAS-Message
                                                                                                                    OPTIONAL. -- Cond nonHO
                                            MasterKeyUpdate
    masterKevUpdate
                                                                                                                    OPTIONAL. -- Cond
MasterKeyChange
    dedicatedSIB1-Delivery
                                            OCTET STRING (CONTAINING SIB1)
                                                                                                                    OPTIONAL. -- Need N
    dedicatedSystemInformationDelivery
                                            OCTET STRING (CONTAINING SystemInformation)
                                                                                                                    OPTIONAL, -- Need N
    otherConfig
                                            OtherConfig
                                                                                                                    OPTIONAL, -- Need M
    nonCriticalExtension
                                            RRCReconfiguration-v1540-IEs
                                                                                                                    OPTIONAL
RRCReconfiguration-v1540-IEs ::=
                                        SEOUENCE {
    otherConfig-v1540
                                            OtherConfig-v1540
                                                                                                                    OPTIONAL, -- Need M
    nonCriticalExtension
                                            RRCReconfiguration-v1560-IEs
                                                                                                                    OPTIONAL
RRCReconfiguration-v1560-IEs ::=
                                         SEOUENCE {
    mrdc-SecondaryCellGroupConfig
                                             SetupRelease { MRDC-SecondaryCellGroupConfig }
                                                                                                                    OPTIONAL,
                                                                                                                               -- Need M
                                             OCTET STRING (CONTAINING RadioBearerConfig)
    radioBearerConfig2
                                                                                                                    OPTIONAL.
                                                                                                                                -- Need M
    sk-Counter
                                                                                                                                -- Need N
                                             SK-Counter
                                                                                                                    OPTIONAL,
    nonCriticalExtension
                                             RRCReconfiguration-v1610-IEs
                                                                                                                    OPTIONAL
RRCReconfiguration-v1610-IEs ::=
                                        SEOUENCE {
    otherConfig-v1610
                                            OtherConfig-v1610
                                                                                                                  OPTIONAL, -- Need M
    bap-Config-r16
                                            SetupRelease { BAP-Config-r16 }
                                                                                                                  OPTIONAL, -- Need M
    iab-IP-AddressConfigurationList-r16
                                            IAB-IP-AddressConfigurationList-r16
                                                                                                                  OPTIONAL, -- Need M
    conditionalReconfiguration-r16
                                            ConditionalReconfiguration-r16
                                                                                                                  OPTIONAL, -- Need M
    daps-SourceRelease-r16
                                            ENUMERATED{true}
                                                                                                                  OPTIONAL, -- Need N
    t.316-r16
                                            SetupRelease {T316-r16}
                                                                                                                  OPTIONAL, -- Need M
                                            SetupRelease {NeedForGapsConfigNR-r16}
                                                                                                                  OPTIONAL, -- Need M
    needForGapsConfigNR-r16
                                            SetupRelease { OnDemandSIB-Request-r16 }
                                                                                                                  OPTIONAL, -- Need M
    onDemandSIB-Request-r16
                                            OCTET STRING (CONTAINING PosSystemInformation-r16-IEs)
    dedicatedPosSvsInfoDeliverv-r16
                                                                                                                  OPTIONAL, -- Need N
    sl-ConfigDedicatedNR-r16
                                            SetupRelease {SL-ConfigDedicatedNR-r16}
                                                                                                                  OPTIONAL, -- Need M
    sl-ConfigDedicatedEUTRA-Info-r16
                                            SetupRelease {SL-ConfigDedicatedEUTRA-Info-r16}
                                                                                                                  OPTIONAL, -- Need M
    targetCellSMTC-SCG-r16
                                                                                                                  OPTIONAL, -- Need S
                                            SSB-MTC
    nonCriticalExtension
                                            RRCReconfiguration-v1700-IEs
                                                                                                                  OPTIONAL
RRCReconfiguration-v1700-IEs ::=
                                        SEOUENCE {
    otherConfig-v1700
                                            OtherConfig-v1700
                                                                                                            OPTIONAL, -- Need M
    sl-L2RelayUE-Config-r17
                                            SetupRelease { SL-L2RelayUE-Config-r17 }
                                                                                                            OPTIONAL, -- Need M
                                            SetupRelease { SL-L2RemoteUE-Config-r17 }
                                                                                                            OPTIONAL, -- Need M
    sl-L2RemoteUE-Config-r17
                                                                                                            OPTIONAL, -- Cond PagingRelay
    dedicatedPagingDelivery-r17
                                            OCTET STRING (CONTAINING Paging)
    needForGapNCSG-ConfigNR-r17
                                            SetupRelease {NeedForGapNCSG-ConfigNR-r17}
                                                                                                            OPTIONAL, -- Need M
    needForGapNCSG-ConfigEUTRA-r17
                                            SetupRelease {NeedForGapNCSG-ConfigEUTRA-r17}
                                                                                                            OPTIONAL, -- Need M
    musim-GapConfig-r17
                                            SetupRelease {MUSIM-GapConfig-r17}
                                                                                                            OPTIONAL, -- Need M
    ul-GapFR2-Config-r17
                                            SetupRelease { UL-GapFR2-Config-r17 }
                                                                                                            OPTIONAL, -- Need M
    scg-State-r17
                                            ENUMERATED { deactivated }
                                                                                                            OPTIONAL, -- Need N
    appLayerMeasConfig-r17
                                            AppLayerMeasConfig-r17
                                                                                                            OPTIONAL, -- Need M
    ue-TxTEG-RequestUL-TDOA-Config-r17
                                            SetupRelease {UE-TxTEG-RequestUL-TDOA-Config-r17}
                                                                                                            OPTIONAL, -- Need M
    nonCriticalExtension
                                            SEQUENCE {}
                                                                                                            OPTIONAL
MRDC-SecondaryCellGroupConfig ::=
                                        SEOUENCE {
    mrdc-ReleaseAndAdd
                                            ENUMERATED {true}
                                                                                                                   OPTIONAL, -- Need N
```

```
mrdc-SecondaryCellGroup
                                            CHOICE {
       nr-SCG
                                                OCTET STRING (CONTAINING RRCReconfiguration),
        eutra-SCG
                                                OCTET STRING
BAP-Config-r16 ::=
                                        SEOUENCE {
    bap-Address-r16
                                            BIT STRING (SIZE (10))
                                                                                                      OPTIONAL, -- Need M
    defaultUL-BAP-RoutingID-r16
                                            BAP-RoutingID-r16
                                                                                                      OPTIONAL, -- Need M
                                                                                                      OPTIONAL, -- Need M
    defaultUL-BH-RLC-Channel-r16
                                            BH-RLC-ChannelID-r16
                                            ENUMERATED {perBH-RLC-Channel, perRoutingID, both}
                                                                                                      OPTIONAL, -- Need R
    flowControlFeedbackType-r16
    . . .
MasterKeyUpdate ::=
                                    SEOUENCE {
    keySetChangeIndicator
                                    BOOLEAN,
    nextHopChainingCount
                                    NextHopChainingCount,
   nas-Container
                                    OCTET STRING
                                                                                                     OPTIONAL,
                                                                                                                  -- Cond securityNASC
    . . .
OnDemandSIB-Request-r16 ::=
                                             SEOUENCE {
    onDemandSIB-RequestProhibitTimer-r16
                                                 ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30}
T316-r16 ::=
                     ENUMERATED {ms50, ms100, ms200, ms300, ms400, ms500, ms600, ms1000, ms1500, ms2000}
IAB-IP-AddressConfigurationList-r16 ::= SEQUENCE {
    iab-IP-AddressToAddModList-r16
                                        SEQUENCE (SIZE(1..maxIAB-IP-Address-r16)) OF IAB-IP-AddressConfiguration-r16 OPTIONAL, -- Need N
    iab-IP-AddressToReleaseList-r16
                                        SEQUENCE (SIZE(1..maxIAB-IP-Address-r16)) OF IAB-IP-AddressIndex-r16
                                                                                                                     OPTIONAL, -- Need N
IAB-IP-AddressConfiguration-r16 ::=
                                        SEQUENCE {
    iab-IP-AddressIndex-r16
                                            IAB-IP-AddressIndex-r16,
   iab-IP-Address-r16
                                            IAB-IP-Address-r16
                                                                                                               OPTIONAL, -- Need M
    iab-IP-Usage-r16
                                            IAB-IP-Usage-r16
                                                                                                               OPTIONAL, -- Need M
    iab-donor-DU-BAP-Address-r16
                                            BIT STRING (SIZE(10))
                                                                                                               OPTIONAL, -- Need M
SL-ConfigDedicatedEUTRA-Info-r16 ::=
                                                SEOUENCE {
    sl-ConfigDedicatedEUTRA-r16
                                                   OCTET STRING
                                                                                                              OPTIONAL, -- Need M
    sl-TimeOffsetEUTRA-List-r16
                                                   SEQUENCE (SIZE (8)) OF SL-TimeOffsetEUTRA-r16
                                                                                                              OPTIONAL
                                                                                                                        -- Need M
SL-TimeOffsetEUTRA-r16 ::=
                                  ENUMERATED {ms0, ms0dot25, ms0dot5, ms0dot625, ms0dot75, ms1, ms1dot25, ms1dot5, ms1dot75,
                                              ms2, ms2dot5, ms3, ms4, ms5, ms6, ms8, ms10, ms20}
UE-TxTEG-RequestUL-TDOA-Config-r17 ::= CHOICE {
    oneShot-r17
    periodicReporting-r17
                                            ENUMERATED { ms160, ms320, ms1280, ms2560, ms61440, ms81920, ms368640, ms737280 }
-- TAG-RRCRECONFIGURATION-STOP
```

-- ASN1STOP

RRCReconfiguration-IEs field descriptions

appLayerMeasConfig

This field is used to configure application layer measurements. This field is absent when the UE is configured to operate with shared spectrum channel access.

bap-Config

This field is used to configure the BAP entity for IAB nodes.

bap-Address

Indicates the BAP address of an IAB-node. The BAP address of an IAB-node cannot be changed once configured for the cell group to the BAP entity.

conditionalReconfiguration

Configuration of candidate target SpCell(s) and execution condition(s) for conditional handover, conditional PSCell addition or conditional PSCell change. The field is absent if any DAPS bearer is configured or if the *masterCellGroup* includes *ReconfigurationWithSync* or if the *sl-L2RemoteUE-Config* or *sl-L2RelayUE-Config* is configured. For conditional PSCell change, the field is absent if the *secondaryCellGroup* includes *ReconfigurationWithSync*. The *RRCReconfiguration* message contained in *DLInformationTransferMRDC* cannot contain the field *conditionalReconfiguration* for conditional PSCell change or for conditional PSCell addition.

daps-SourceRelease

Indicates to UE that the source cell part of DAPS operation is to be stopped and the source cell part of DAPS configuration is to be released.

dedicatedNAS-MessageList

This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for each PDU in the list.

dedicatedPagingDelivery

This field is used to transfer Paging message for the associated L2 U2N Remote UE to the L2 U2N Relay UE in RRC_CONNECTED.

dedicatedPosSysInfoDelivery

This field is used to transfer SIBPos to the UE in RRC CONNECTED.

dedicatedSIB1-Delivery

This field is used to transfer SIB1 to the UE (including L2 U2N Remote UE). The field has the same values as the corresponding configuration in servingCellConfigCommon.

dedicatedSystemInformationDelivery

This field is used to transfer SIB6, SIB7, SIB8, SIB19, SIB21 to the UE with an active BWP with no common search space configured or the L2 U2N Remote UE in RRC_CONNECTED. For UEs in RRC_CONNECTED (including L2 U2N Remote UE), this field is also used to transfer the SIBs requested on-demand.

defaultUL-BAP-RoutingID

This field is used for IAB-node to configure the default uplink Routing ID, which is used by IAB-node during IAB-node bootstrapping, migration, IAB-MT RRC resume and IAB-MT RRC re-establishment for *F1-C* and *non-F1* traffic. The *defaultUL-BAP-RoutingID* can be (re-)configured when IAB-node IP address for *F1-C* related traffic changes. This field is mandatory only for IAB-node bootstrapping.

defaultUL-BH-RLC-Channel

This field is used for IAB-node to configure the default uplink BH RLC channel, which is used by IAB-node during IAB-node bootstrapping, migration, IAB-MT RRC resume and IAB-MT RRC re-establishment for F1-C and non-F1 traffic. The defaultUL-BH-RLC-Channel can be (re-)configured when IAB-node IP address for F1-C related traffic changes, and the new IP address is anchored at a different IAB-donor-DU. This field is mandatory for IAB-node bootstrapping. If the IAB-MT is operating in EN-DC, the default uplink BH RLC channel is referring to an RLC channel on the SCG; Otherwise, it is referring to an RLC channel either on the MCG or on the SCG depending on whether the MN or the SN configures this field.

flowControlFeedbackType

This field is only used for IAB-node that support hop-by-hop flow control to configure the type of flow control feedback. Value *perBH-RLC-Channel* indicates that the IAB-node shall provide flow control feedback per BH RLC channel, value *perRoutingID* indicates that the IAB-node shall provide flow control feedback per routing ID, and value *both* indicates that the IAB-node shall provide flow control feedback both per BH RLC channel and per routing ID.

fullConfig

Indicates that the full configuration option is applicable for the *RRCReconfiguration* message for intra-system intra-RAT HO. For inter-RAT HO from E-UTRA to NR, *fullConfig* indicates whether or not delta signalling of SDAP/PDCP from source RAT is applicable. This field is absent if any DAPS bearer is configured or when the *RRCReconfiguration* message is transmitted on SRB3, and in an *RRCReconfiguration* message for SCG contained in another *RRCReconfiguration* message (or *RRCConnectionReconfiguration* message, see TS 36.331 [10]) transmitted on SRB1.

iab-IP-Address

This field is used to provide the IP address information for IAB-node.

iab-IP-AddressIndex

This field is used to identify a configuration of an IP address.

iab-IP-AddressToAddModList

List of IP addresses allocated for IAB-node to be added and modified.

iab-IP-AddressToReleaseList

List of IP address allocated for IAB-node to be released.

iab-IP-Usage

This field is used to indicate the usage of the assigned IP address. If this field is not configured, the assigned IP address is used for all traffic.

iab-donor-DU-BAP-Address

This field is used to indicate the BAP address of the IAB-donor-DU where the IP address is anchored.

keySetChangeIndicator

Indicates whether UE shall derive a new K_{gNB} . If reconfigurationWithSync is included, value true indicates that a K_{gNB} key is derived from a K_{gNB} key taken into use through the latest successful NAS SMC procedure, or N2 handover procedure with K_{gNB} change, as described in TS 33.501 [11] for K_{gNB} re-keying. Value false indicates that the new K_{gNB} key is obtained from the current K_{gNB} key or from the NH as described in TS 33.501 [11].

masterCellGroup

Configuration of master cell group.

mrdc-ReleaseAndAdd

This field indicates that the current SCG configuration is released and a new SCG is added at the same time.

mrdc-SecondaryCellGroup

Includes an RRC message for SCG configuration in NR-DC or NE-DC.

For NR-DC (nr-SCG), *mrdc-SecondaryCellGroup* contains the *RRCReconfiguration* message as generated (entirely) by SN gNB. In this version of the specification, the RRC message can only include fields *secondaryCellGroup*, *otherConfig*, *conditionalReconfiguration*, *measConfig*, *bap-Config* and *IAB-IP-AddressConfigurationList*.

For NE-DC (eutra-SCG), *mrdc-SecondaryCellGroup* includes the E-UTRA *RRCConnectionReconfiguration* message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field *scg-Configuration*.

musim-GapConfig

Indicates the MUSIM gap configuration and controls setup/release of MUSIM gaps. In this version of the specification, the network does not configure MUSIM gap together with concurrent measurement gap or preconfigured measurement gap for positioning.

nas-Container

This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this field, although it affects activation of AS security after inter-system handover to NR. The content is defined in TS 24.501 [23].

needForGapsConfigNR

Configuration for the UE to report measurement gap requirement information of NR target bands in the RRCReconfigurationComplete and RRCResumeComplete message.

needForGapNCSG-ConfigEUTRA

Configuration for the UE to report measurement gap and NCSG requirement information of E-UTRA target bands in the *RRCReconfigurationComplete* and *RRCResumeComplete* message.

needForGapNCSG-ConfigNR

Configuration for the UE to report measurement gap and NCSG requirement information of NR target bands in the RRCReconfigurationComplete and RRCResumeComplete message.

nextHopChainingCount

Parameter NCC: See TS 33.501 [11]

onDemandSIB-Request

If the field is present, the UE is allowed to request SIB(s) on-demand while in RRC CONNECTED according to clause 5.2.2.3.5.

onDemandSIB-RequestProhibitTimer

Prohibit timer for requesting SIB(s) on-demand while in RRC_CONNECTED according to clause 5.2.2.3.5. Value in seconds. Value s0 means prohibit timer is set to 0 seconds, value s0dot5 means prohibit timer is set to 0.5 seconds, value s1 means prohibit timer is set to 1 second and so on.

otherConfig

Contains configuration related to other configurations. When configured for the SCG, only fields drx-PreferenceConfig, maxBW-PreferenceConfig, maxBW-PreferenceConfig, maxMIMO-LayerPreferenceConfig, maxMIMO-LayerPrefer

radioBearerConfig

Configuration of Radio Bearers (DRBs, SRBs, multicast MRBs) including SDAP/PDCP. In (NG)EN-DC this field may only be present if the *RRCReconfiguration* is transmitted over SRB3.

radioBearerConfig2

Configuration of Radio Bearers (DRBs, SRBs) including SDAP/PDCP. This field can only be used if the UE supports NR-DC or NE-DC.

scg-State

Indicates that the SCG is in deactivated state.

This field is not used

- in an RRCReconfiguration message received:
 - within mrdc-SecondaryCellGroup, or
 - in an E-UTRA RRCConnectionReconfiguration message, or
 - in an E-UTRA RRCConnectionResume message or
- in an RRCReconfiguration message received via SRB3, except if the RRCReconfiguration message is included in DLInformationTransferMRDC.

The field is absent if CPA or CPC is configured for the UE, or if the RRCReconfiguration message is contained in CondRRCReconfig.

sl-L2RelayUE-Config

Contains L2 U2N relay operation related configurations used by a UE acting as or to be acting as a L2 U2N Relay UE. The field is absent if *conditionalReconfiguration* is configured for CHO.

sI-L2RemoteUE-Config

Contains L2 U2N relay operation related configurations used by a UE acting as or to be acting as a L2 U2N Remote UE. The field is absent if *conditionalReconfiguration* is configured for CHO, or if *appLayerMeasConfig* or SRB4 is configured/not released.

secondaryCellGroup

Configuration of secondary cell group ((NG)EN-DC or NR-DC).

sk-Counter

A counter used upon initial configuration of S-K_{gNB} or S-K_{eNB}, as well as upon refresh of S-K_{gNB} or S-K_{eNB}. This field is always included either upon initial configuration of an NR SCG or upon configuration of the first RB with *keyToUse* set to *secondary*, whichever happens first. This field is absent if there is neither any NR SCG nor any RB with *keyToUse* set to *secondary*.

sl-ConfigDedicatedNR

This field is used to provide the dedicated configurations for NR sidelink communication/discovery.

sI-ConfigDedicatedEUTRA-Info

This field includes the E-UTRA *RRCConnectionReconfiguration* as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA *RRCConnectionReconfiguration* can only includes sidelink related fields for V2X sidelink communication, i.e. *sl-V2X-ConfigDedicated*, *sl-V2X-SPS-Config*, *measConfig* and/or *otherConfig*.

sI-TimeOffsetEUTRA

This field indicates the possible time offset to (de)activation of V2X sidelink transmission after receiving DCI format 3_1 used for scheduling V2X sidelink communication. Value ms0dpt75 corresponds to 0.75ms. ms1 corresponds to 1ms and so on. The network includes this field only when sl-ConfigDedicatedEUTRA is configured.

targetCellSMTC-SCG

The SSB periodicity/offset/duration configuration of target cell for NR PSCell addition and SN change. When UE receives this field, UE applies the configuration based on the timing reference of NR PCell for PSCell addition and PSCell change for the case of no reconfiguration with sync of MCG, and UE applies the configuration based on the timing reference of target NR PCell for the case of reconfiguration with sync of MCG. If both this field and the *smtc* in *secondaryCellGroup -> SpCellConfig -> reconfigurationWithSync* are absent, the UE uses the SMTC in the *measObjectNR* having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message.

t316

Indicates the value for timer T316 as described in clause 7.1. Value *ms50* corresponds to 50 ms, value *ms100* corresponds to 100 ms and so on. This field can be configured only if the UE is configured with split SRB1 or SRB3.

ue-TxTEG-RequestUL-TDOA-Config

Configures the periodicity of UE reporting for the association between Tx TEG and SRS Positioning resources. When configured with *oneShot* UE reports the association only one time. When configured with *periodicReporting* UE reports the association periodically and the *periodicReporting* indicates the periodicity. Value *ms160* corresponds to 160ms, value *ms320* corresponds to 320ms and so on.

ul-GapFR2-Config

Indicates the FR2 UL gap configuration to UE. In EN-DC and NGEN-DC, the SN decides and configures the FR2 UL gap pattern. In NE-DC, the MN decides and configures the FR2 UL gap pattern. In NR-DC without FR2-FR2 band combination, the network entity which is configured with FR2 serving cell(s) decides and configures the FR2 UL gap pattern.

Conditional Presence	Explanation
nonHO	The field is absent in case of reconfiguration with sync within NR or to NR; otherwise it is optionally present, need N.
securityNASC	This field is mandatory present in case of inter system handover. Otherwise the field is optionally present, need N.
MasterKeyChange	This field is mandatory present in case masterCellGroup includes ReconfigurationWithSync and RadioBearerConfig includes
	SecurityConfig with SecurityAlgorithmConfig, indicating a change of the AS security algorithms associated to the master key.
	If ReconfigurationWithSync is included for other cases, this field is optionally present, need N. Otherwise the field is absent.
FullConfig	The field is mandatory present in case of inter-system handover from E-UTRA/EPC to NR. It is optionally present, Need N,
	during reconfiguration with sync and also in first reconfiguration after reestablishment; or for intra-system handover from E-
	UTRA/5GC to NR. It is absent otherwise.
SCG	The field is mandatory present in:
	 an RRCReconfiguration message contained in an RRCResume message (or in an RRCConnectionResume
	message, see TS 36.331 [10]),
	- an RRCReconfiguration message contained in an RRCConnectionReconfiguration message, see TS 36.331 [10],
	which is contained in DLInformationTransferMRDC transmitted on SRB3 (as a response to
	ULInformationTransferMRDC including an MCGFailureInformation).
	The field is optional present, Need M, in:
	- an RRCReconfiguration message transmitted on SRB3,
	 an RRCReconfiguration message contained in another RRCReconfiguration message (or in an
	RRCConnectionReconfiguration message, see TS 36.331 [10]) transmitted on SRB1
	 an RRCReconfiguration message contained in another RRCReconfiguration message which is contained in
	DLInformationTransferMRDC transmitted on SRB3 (as a response to ULInformationTransferMRDC including an
	MCGFailureInformation)
	Otherwise, the field is absent
PagingRelay	For L2 U2N Relay UE, the field is optionally present, Need N. Otherwise, it is absent.

RRCReconfigurationComplete

The RRCReconfigurationComplete message is used to confirm the successful completion of an RRC connection reconfiguration.

Signalling radio bearer: SRB1 or SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

RRCReconfigurationComplete message

```
-- ASN1START
-- TAG-RRCRECONFIGURATIONCOMPLETE-START
RRCReconfigurationComplete ::=
                                            SEOUENCE {
    rrc-TransactionIdentifier
                                                RRC-TransactionIdentifier,
    criticalExtensions
                                                CHOICE {
        rrcReconfigurationComplete
                                                     RRCReconfigurationComplete-IEs,
        criticalExtensionsFuture
                                                     SEQUENCE {}
RRCReconfigurationComplete-IEs ::=
                                            SEQUENCE {
    lateNonCriticalExtension
                                                OCTET STRING
                                                                                                                          OPTIONAL,
    nonCriticalExtension
                                                RRCReconfigurationComplete-v1530-IEs
                                                                                                                          OPTIONAL
RRCReconfigurationComplete-v1530-IEs ::=
                                            SEOUENCE {
    uplinkTxDirectCurrentList
                                                UplinkTxDirectCurrentList
                                                                                                                          OPTIONAL,
    nonCriticalExtension
                                                RRCReconfigurationComplete-v1560-IEs
                                                                                                                          OPTIONAL
RRCReconfigurationComplete-v1560-IEs ::=
                                            SEOUENCE {
    scq-Response
                                                CHOICE {
       nr-SCG-Response
                                                     OCTET STRING (CONTAINING RRCReconfigurationComplete),
        eutra-SCG-Response
                                                     OCTET STRING
                                                                                                                              OPTIONAL.
    nonCriticalExtension
                                                RRCReconfigurationComplete-v1610-IEs
                                                                                                                          OPTIONAL
RRCReconfigurationComplete-v1610-IEs ::=
                                            SEOUENCE {
    ue-MeasurementsAvailable-r16
                                                UE-MeasurementsAvailable-r16
                                                                                                                          OPTIONAL,
    needForGapsInfoNR-r16
                                                NeedForGapsInfoNR-r16
                                                                                                                          OPTIONAL,
    nonCriticalExtension
                                                RRCReconfigurationComplete-v1640-IEs
                                                                                                                          OPTIONAL
RRCReconfigurationComplete-v1640-IEs ::=
    uplinkTxDirectCurrentTwoCarrierList-r16
                                                UplinkTxDirectCurrentTwoCarrierList-r16
                                                                                                                          OPTIONAL,
    nonCriticalExtension
                                                RRCReconfigurationComplete-v1700-IEs
                                                                                                                          OPTIONAL
RRCReconfigurationComplete-v1700-IEs ::=
                                            SEOUENCE {
    needForGapNCSG-InfoNR-r17
                                                NeedForGapNCSG-InfoNR-r17
                                                                                                                          OPTIONAL,
    needForGapNCSG-InfoEUTRA-r17
                                                NeedForGapNCSG-InfoEUTRA-r17
                                                                                                                          OPTIONAL,
    selectedCondRRCReconfig-r17
                                                CondReconfigId-r16
                                                                                                                          OPTIONAL,
    nonCriticalExtension
                                                RRCReconfigurationComplete-v1720-IEs
                                                                                                                          OPTIONAL
RRCReconfigurationComplete-v1720-IEs ::=
    uplinkTxDirectCurrentMoreCarrierList-r17
                                                UplinkTxDirectCurrentMoreCarrierList-r17
                                                                                                                          OPTIONAL,
```

OPTIONAL

```
nonCriticalExtension SEQUENCE {}
}
-- TAG-RRCRECONFIGURATIONCOMPLETE-STOP
-- ASN1STOP
```

RRCReconfigurationComplete-IEs field descriptions

needForGapsInfoNR

This field is used to indicate the measurement gap requirement information of the UE for NR target bands.

needForGapNCSG-InfoEUTRA

This field is used to indicate the measurement gap and NCSG requirement information of the UE for E-UTRA target bands.

needForGapNCSG-InfoNR

This field is used to indicate the measurement gap and NCSG requirement information of the UE for NR target bands.

scg-Response

In case of NR-DC (nr-SCG-Response), this field includes the RRCReconfigurationComplete message. In case of NE-DC (eutra-SCG-Response), this field includes the E-UTRA RRCConnectionReconfigurationComplete message as specified in TS 36.331 [10].

selectedCondRRCReconfia

This field indicates the ID of the selected conditional reconfiguration the UE applied upon the execution of CPA or inter-SN CPC.

uplinkTxDirectCurrentList

The Tx Direct Current locations for the configured serving cells and BWPs if requested by the NW (see reportUplinkTxDirectCurrent in CellGroupConfig).

uplinkTxDirectCurrentMoreCarrierList

The Tx Direct Current locations for the configured intra-band CA requested by reportUplinkTxDirectCurrentMoreCarrier-r17.

uplinkTxDirectCurrentTwoCarrierList

The Tx Direct Current locations for the configured uplink intra-band CA with two carriers if requested by the NW (see reportUplinkTxDirectCurrentTwoCarrier-r16 in CellGroupConfig).

– RRCReject

The RRCReject message is used to reject an RRC connection establishment or an RRC connection resumption.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: Network to UE

RRCReject message

```
-- ASN1START
-- TAG-RRCREJECT-START

RRCReject ::= SEQUENCE {
    criticalExtensions CHOICE {
```

```
RRCReject-IEs,
        rrcReject
       criticalExtensionsFuture
                                            SEQUENCE {}
RRCReject-IEs ::=
                                    SEOUENCE {
    waitTime
                                        RejectWaitTime
                                                                                                                  OPTIONAL,
                                                                                                                              -- Need N
   lateNonCriticalExtension
                                        OCTET STRING
                                                                                                                  OPTIONAL,
   nonCriticalExtension
                                        SEQUENCE { }
                                                                                                                  OPTIONAL
-- TAG-RRCREJECT-STOP
-- ASN1STOP
```

RRCReject-IEs field descriptions

waitTime

Wait time value in seconds. The field is always included.

RRCRelease

The RRCRelease message is used to command the release of an RRC connection or the suspension of the RRC connection.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

RRCRelease message

```
-- ASN1START
-- TAG-RRCRELEASE-START
RRCRelease ::=
                                    SEQUENCE {
                                       RRC-TransactionIdentifier,
    rrc-TransactionIdentifier
    criticalExtensions
                                       CHOICE {
                                           RRCRelease-IEs,
       rrcRelease
       criticalExtensionsFuture
                                           SEQUENCE {}
                                   SEQUENCE {
RRCRelease-IEs ::=
    redirectedCarrierInfo
                                       RedirectedCarrierInfo
                                                                                                                   OPTIONAL, -- Need N
                                       CellReselectionPriorities
    cellReselectionPriorities
                                                                                                                   OPTIONAL, -- Need R
    suspendConfig
                                       SuspendConfig
                                                                                                                   OPTIONAL, -- Need R
    deprioritisationReq
                                       SEQUENCE {
```

```
deprioritisationType
                                             ENUMERATED {frequency, nr},
        deprioritisationTimer
                                             ENUMERATED {min5, min10, min15, min30}
                                                                                                                       OPTIONAL.
                                                                                                                                   -- Need N
    lateNonCriticalExtension
                                             OCTET STRING
                                                                                                                   OPTIONAL,
    nonCriticalExtension
                                             RRCRelease-v1540-IEs
                                                                                                                   OPTIONAL
                                     SEOUENCE {
RRCRelease-v1540-IEs ::=
    waitTime
                                        RejectWaitTime
                                                                       OPTIONAL, -- Need N
                                        RRCRelease-v1610-IEs
    nonCriticalExtension
                                                                      OPTIONAL
RRCRelease-v1610-IEs ::=
                                     SEOUENCE {
    voiceFallbackIndication-r16
                                        ENUMERATED {true}
                                                                                       OPTIONAL, -- Need N
    measIdleConfig-r16
                                        SetupRelease {MeasIdleConfigDedicated-r16}
                                                                                       OPTIONAL, -- Need M
    nonCriticalExtension
                                        RRCRelease-v1650-IEs
                                                                                       OPTIONAL
RRCRelease-v1650-IEs ::=
                                     SEOUENCE {
                                        ENUMERATED {true}
    mpsPriorityIndication-r16
                                                                                       OPTIONAL, -- Cond Redirection2
    nonCriticalExtension
                                        RRCRelease-v1710-IEs
                                                                                       OPTIONAL
RRCRelease-v1710-IEs ::=
                                     SEOUENCE {
    noLastCellUpdate-r17
                                         ENUMERATED {true}
                                                                                                   -- Need S
                                                                                       OPTIONAL,
    nonCriticalExtension
                                         SEQUENCE {}
                                                                                       OPTIONAL
RedirectedCarrierInfo ::=
                                     CHOICE {
                                         CarrierInfoNR,
    nr
    eutra
                                         RedirectedCarrierInfo-EUTRA,
    . . .
RedirectedCarrierInfo-EUTRA ::=
                                     SEOUENCE {
    eutraFrequency
                                         ARFCN-ValueEUTRA,
                                         ENUMERATED {epc,fiveGC}
                                                                                                               OPTIONAL
                                                                                                                           -- Need N
    cnType
CarrierInfoNR ::=
                                     SEOUENCE {
    carrierFreq
                                         ARFCN-ValueNR,
    ssbSubcarrierSpacing
                                         SubcarrierSpacing,
                                         SSB-MTC
                                                                                                                              -- Need S
    smtc
                                                                                                              OPTIONAL,
    . . .
SuspendConfig ::=
                                     SEOUENCE
    fullI-RNTI
                                         I-RNTI-Value,
    shortI-RNTI
                                         ShortI-RNTI-Value,
    ran-PagingCycle
                                         PagingCycle,
    ran-NotificationAreaInfo
                                         RAN-NotificationAreaInfo
                                                                                                               OPTIONAL,
                                                                                                                           -- Need M
    t380
                                         PeriodicRNAU-TimerValue
                                                                                                              OPTIONAL,
                                                                                                                           -- Need R
    nextHopChainingCount
                                         NextHopChainingCount,
    . . . ,
```

```
sl-UEIdentityRemote-r17
                                        RNTI-Value
                                                                                                             OPTIONAL, -- Cond L2RemoteUE
    sdt-Config-r17
                                        SetupRelease { SDT-Config-r17 }
                                                                                                             OPTIONAL. -- Need M
    srs-PosRRC-Inactive-r17
                                        SetupRelease { SRS-PosRRC-Inactive-r17 }
                                                                                                             OPTIONAL,
                                                                                                                        -- Need M
    ran-ExtendedPagingCycle-r17
                                        ExtendedPagingCycle-r17
                                                                                                             OPTIONAL
                                                                                                                        -- Cond RANPaging
    ]]
PeriodicRNAU-TimerValue ::=
                                    ENUMERATED { min5, min10, min20, min30, min60, min120, min360, min720}
CellReselectionPriorities ::=
                                    SEQUENCE {
    freqPriorityListEUTRA
                                        FreqPriorityListEUTRA
                                                                                                             OPTIONAL,
                                                                                                                             -- Need M
    freqPriorityListNR
                                        FregPriorityListNR
                                                                                                             OPTIONAL,
                                                                                                                             -- Need M
    t.320
                                        ENUMERATED {min5, min10, min20, min30, min60, min120, min180, spare1} OPTIONAL,
                                                                                                                             -- Need R
    . . . .
    11
    freqPriorityListDedicatedSlicing-r17 FreqPriorityListDedicatedSlicing-r17
                                                                                                             OPTIONAL
                                                                                                                             -- Need M
    ]]
PagingCycle ::=
                                    ENUMERATED {rf32, rf64, rf128, rf256}
                                    ENUMERATED {rf256, rf512, rf1024, spare1}
ExtendedPagingCycle-r17 ::=
FreqPriorityListEUTRA ::=
                                    SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA
                                    SEQUENCE (SIZE (1..maxFreg)) OF FregPriorityNR
FreqPriorityListNR ::=
FreqPriorityEUTRA ::=
                                    SEOUENCE {
    carrierFreq
                                        ARFCN-ValueEUTRA,
    cellReselectionPriority
                                        CellReselectionPriority,
    cellReselectionSubPriority
                                        CellReselectionSubPriority
                                                                                                             OPTIONAL
                                                                                                                             -- Need R
FreqPriorityNR ::=
                                    SEOUENCE {
    carrierFreq
                                        ARFCN-ValueNR,
    cellReselectionPriority
                                        CellReselectionPriority,
    cellReselectionSubPriority
                                        CellReselectionSubPriority
                                                                                                             OPTIONAL
                                                                                                                             -- Need R
RAN-NotificationAreaInfo ::=
                                    CHOICE {
    cellList
                                        PLMN-RAN-AreaCellList,
    ran-AreaConfigList
                                        PLMN-RAN-AreaConfigList,
PLMN-RAN-AreaCellList ::=
                                    SEOUENCE (SIZE (1.. maxPLMNIdentities)) OF PLMN-RAN-AreaCell
PLMN-RAN-AreaCell ::=
                                    SEQUENCE {
    plmn-Identity
                                        PLMN-Identity
                                                                                                             OPTIONAL, -- Need S
    ran-AreaCells
                                        SEQUENCE (SIZE (1..32)) OF CellIdentity
PLMN-RAN-AreaConfigList ::=
                                    SEQUENCE (SIZE (1..maxPLMNIdentities)) OF PLMN-RAN-AreaConfig
```

```
PLMN-RAN-AreaConfig ::=
                                   SEOUENCE {
    plmn-Identity
                                       PLMN-Identity
                                                                                                           OPTIONAL.
                                                                                                                     -- Need S
    ran-Area
                                       SEQUENCE (SIZE (1..16)) OF RAN-AreaConfig
RAN-AreaConfig ::=
                                   SEOUENCE {
    trackingAreaCode
                                       TrackingAreaCode,
    ran-AreaCodeList
                                       SEQUENCE (SIZE (1..32)) OF RAN-AreaCode
                                                                                                           OPTIONAL
                                                                                                                       -- Need R
SDT-Config-r17 ::=
                                   SEQUENCE {
    sdt-DRB-List-r17
                                       SEQUENCE (SIZE (0..maxDRB)) OF DRB-Identity
                                                                                                           OPTIONAL,
                                                                                                                       -- Need M
    sdt-SRB2-Indication-r17
                                       ENUMERATED {allowed}
                                                                                                           OPTIONAL.
                                                                                                                      -- Need R
    sdt-MAC-PHY-CG-Config-r17
                                       SetupRelease {SDT-CG-Config-r17}
                                                                                                           OPTIONAL,
                                                                                                                      -- Need M
    sdt-DRB-ContinueROHC-r17
                                       ENUMERATED { cell, rna }
                                                                                                           OPTIONAL
                                                                                                                       -- Need S
SDT-CG-Config-r17 ::= OCTET STRING (CONTAINING SDT-MAC-PHY-CG-Config-r17)
SDT-MAC-PHY-CG-Config-r17 ::=
                                   SEOUENCE {
    -- CG-SDT specific configuration
    cq-SDT-ConfigLCH-RestrictionToAddModList-r17 SEQUENCE (SIZE(1..maxLC-ID)) OF CG-SDT-ConfigLCH-Restriction-r17 OPTIONAL, -- Need N
    cg-SDT-ConfigLCH-RestrictionToReleaseList-r17 SEQUENCE (SIZE(1..maxLC-ID)) OF LogicalChannelIdentity OPTIONAL, -- Need N
    cg-SDT-ConfigInitialBWP-NUL-r17
                                         SetupRelease {BWP-UplinkDedicatedSDT-r17}
                                                                                                       OPTIONAL, -- Need M
    cg-SDT-ConfigInitialBWP-SUL-r17
                                          SetupRelease {BWP-UplinkDedicatedSDT-r17}
                                                                                                       OPTIONAL, -- Need M
                                         BWP-DownlinkDedicatedSDT-r17
                                                                                                       OPTIONAL, -- Need M
    cq-SDT-ConfigInitialBWP-DL-r17
    cg-SDT-TimeAlignmentTimer-r17
                                           TimeAlignmentTimer
                                                                                                           OPTIONAL, -- Need M
    cg-SDT-RSRP-ThresholdSSB-r17
                                           RSRP-Range
                                                                                                           OPTIONAL, -- Need M
                                           SetupRelease { CG-SDT-TA-ValidationConfig-r17 }
    cg-SDT-TA-ValidationConfig-r17
                                                                                                           OPTIONAL, -- Need M
    cg-SDT-CS-RNTI-r17
                                           RNTI-Value
                                                                                                           OPTIONAL,
                                                                                                                     -- Need M
CG-SDT-TA-ValidationConfig-r17 ::= SEQUENCE
    cg-SDT-RSRP-ChangeThreshold-r17
                                       ENUMERATED { dB2, dB4, dB6, dB8, dB10, dB14, dB18, dB22,
                                           dB26, dB30, dB34, spare5, spare4, spare3, spare2, spare1}
BWP-DownlinkDedicatedSDT-r17 ::=
                                    SEOUENCE {
    pdcch-Config-r17
                                       SetupRelease { PDCCH-Config
                                                                                                           OPTIONAL,
                                                                                                                     -- Need M
   pdsch-Config-r17
                                       SetupRelease { PDSCH-Config
                                                                                                           OPTIONAL.
                                                                                                                      -- Need M
BWP-UplinkDedicatedSDT-r17 ::=
                                   SEQUENCE {
    pusch-Config-r17
                                       SetupRelease { PUSCH-Config }
                                                                                                           OPTIONAL,
                                                                                                                      -- Need M
    configuredGrantConfigToAddModList-r17
                                                         ConfiguredGrantConfigToAddModList-r16
                                                                                                           OPTIONAL, -- Need N
    configuredGrantConfigToReleaseList-r17
                                                         ConfiguredGrantConfigToReleaseList-r16
                                                                                                           OPTIONAL,
                                                                                                                     -- Need N
CG-SDT-ConfigLCH-Restriction-r17 ::= SEQUENCE {
    logicalChannelIdentity-r17
                                       LogicalChannelIdentity,
```

```
ENUMERATED {true}
    configuredGrantType1Allowed-r17
                                                                                                       OPTIONAL, -- Need R
   allowedCG-List-r17
                                      SEQUENCE (SIZE (0.. maxNrofConfiguredGrantConfigMAC-1-r16)) OF ConfiguredGrantConfigIndexMAC-r16
                                                                                                       OPTIONAL -- Need R
SRS-PosRRC-Inactive-r17 ::= OCTET STRING (CONTAINING SRS-PosRRC-InactiveConfig-r17)
SRS-PosRRC-InactiveConfig-r17 ::=
                                      SEOUENCE {
   srs-PosConfigNUL-r17
                                          SRS-PosConfig-r17
                                                                                                           OPTIONAL,
                                                                                                                        -- Need R
   srs-PosConfigSUL-r17
                                          SRS-PosConfig-r17
                                                                                                           OPTIONAL,
                                                                                                                        -- Need R
   bwp-NUL-r17
                                                                                                           OPTIONAL,
                                                                                                                       -- Need S
                                          BWP
   bwp-SUL-r17
                                                                                                           OPTIONAL,
                                                                                                                        -- Need S
   -- Need M
                                                                                                           OPTIONAL,
   inactivePosSRS-RSRP-ChangeThreshold-r17 RSRP-ChangeThreshold-r17
                                                                                                           OPTIONAL
                                                                                                                        -- Need M
RSRP-ChangeThreshold-r17 ::= ENUMERATED {dB4, dB6, dB8, dB10, dB14, dB18, dB22, dB26, dB30, dB34, spare6, spare5, spare4, spare3, spare2, spare1}
SRS-PosConfig-r17 ::=
                                  SEOUENCE {
   srs-PosResourceSetToReleaseList-r17 SEQUENCE (SIZE(1..maxNrofSRS-PosResourceSets-r16)) OF SRS-PosResourceSetId-r16 OPTIONAL, -- Need N
    srs-PosResourceSetToAddModList-r17 SEQUENCE (SIZE(1..maxNrofSRS-PosResourceSets-r16)) OF SRS-PosResourceSet-r16 OPTIONAL, -- Need N
   srs-PosResourceToReleaseList-r17
                                      SEQUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResourceId-r16
                                                                                                                 OPTIONAL, -- Need N
    srs-PosResourceToAddModList-r17
                                      SEQUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResource-r16
                                                                                                                 OPTIONAL -- Need N
-- TAG-RRCRELEASE-STOP
-- ASN1STOP
```

RRCRelease-IEs field descriptions

cellReselectionPriorities

Dedicated priorities to be used for cell reselection as specified in TS 38.304 [20]. The maximum number of NR carrier frequencies that the network can configure through FreqPriorityListNR and FreqPriorityListDedicatedSlicing together is eight. If the same frequency is configured in both FreqPriorityListNR and FreqPriorityListDedicatedSlicing, the frequency is only counted once.

cnType

Indicate that the UE is redirected to EPC or 5GC.

deprioritisationReq

Indicates whether the current frequency or RAT is to be de-prioritised.

deprioritisationTimer

Indicates the period for which either the current carrier frequency or NR is deprioritised. Value minN corresponds to N minutes.

measIdleConfig

Indicates measurement configuration to be stored and used by the UE while in RRC_IDLE or RRC_INACTIVE.

mpsPriorityIndication

Indicates the UE can set the establishment cause to mps-PriorityAccess for a new connection following a redirect to NR. If the target RAT is E-UTRA, see TS 36.331 [10]. The gNB sets the indication only for UEs authorized to receive MPS treatment as indicated by ARP and/or QoS characteristics at the gNB, and it is applicable only for this instance of release with redirection to carrier/RAT included in the *redirectedCarrierInfo* field in the *RRCRelease* message.

noLastCellUpdate

Presence of the field indicates that the last used cell for PEI shall not be updated. When the field is absent, the PEI-capable UE shall update its last used cell with the current cell. The UE shall not update its last used cell with the current cell if the AS security is not activated.

srs-PosRRC-InactiveConfig

SRS for positioning configuration during RRC_INACTIVE state.

suspendConfig

Indicates configuration for the RRC_INACTIVE state. The network does not configure *suspendConfig* when the network redirect the UE to an inter-RAT carrier frequency or if the UE is configured with a DAPS bearer.

redirectedCarrierInfo

Indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to an NR or an inter-RAT carrier frequency, by means of cell selection at transition to RRC_IDLE or RRC_INACTIVE as specified in TS 38.304 [20]. Based on UE capability, the network may include *redirectedCarrierInfo* in *RRCRelease* message with *suspendConfig* if this message is sent in response to an *RRCResumeRequest* or an *RRCResumeRequest* which is triggered by the NAS layer (see 5.3.1.4 in TS 24.501 [23]).

voiceFallbackIndication

Indicates the RRC release is triggered by EPS fallback for IMS voice as specified in TS 23.502 [43].

CarrierInfoNR field descriptions

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carrierFreq

Indicates the redirected NR frequency.

ssbSubcarrierSpacing

Subcarrier spacing of SSB in the redirected SSB frequency.

Only the following values are applicable depending on the used frequency:

FR1: 15 or 30 kHz FR2-1: 120 or 240 kHz FR2-2: 120, 480, or 960 kHz

smtc

The SSB periodicity/offset/duration configuration for the redirected SSB frequency. It is based on timing reference of PCell. If the field is absent, the UE uses the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing.

RAN-NotificationAreaInfo field descriptions

cellList

A list of cells configured as RAN area.

ran-AreaConfigList

A list of RAN area codes or RA code(s) as RAN area.

PLMN-RAN-AreaConfig field descriptions

plmn-Identity

PLMN Identity to which the cells in *ran-Area* belong. If the field is absent the UE not in SNPN access mode uses the ID of the registered PLMN. This field is not included for UE in SNPN access mode (for UE in SNPN access mode the *ran-Area* always belongs to the registered SNPN).

ran-AreaCodeList

The total number of RAN-AreaCodes of all PLMNs does not exceed 32.

ran-Area

Indicates whether TA code(s) or RAN area code(s) are used for the RAN notification area. The network uses only TA code(s) or both TA code(s) and RAN area code(s) to configure a UE. The total number of TACs across all PLMNs does not exceed 16.

PLMN-RAN-AreaCell field descriptions

plmn-Identity

PLMN Identity to which the cells in *ran-AreaCells* belong. If the field is absent the UE not in SNPN access mode uses the ID of the registered PLMN. This field is not included for UE in SNPN access mode (for UE in SNPN access mode (for UE in SNPN access mode the *ran-AreaCells* always belongs to the registered SNPN).

ran-AreaCells

The total number of cells of all PLMNs does not exceed 32.

SDT-Config field descriptions

sdt-DRB-ContinueROHC

Indicates whether the PDCP entity of the radio bearers configured for SDT continues or resets the ROHC header compression protocol during PDCP re-establishment during SDT procedure, as specified in TS 38.323 [5]. Value *cell* indicates that ROHC header compression continues when the UE resumes for SDT in the same cell as the PCell when the RRCRelease message was received. Value *rna* indicates that ROHC header compression continues when the UE resumes for SDT in a cell belonging to the same RNA as the PCell where the RRCRelease message was received. If the field is absent, the UE releases any stored value for this field and the PDCP entity of the radio bearers configured for SDT always resets the ROHC header compression protocol during PDCP re-establishment when SDT procedure is initiated, as specified in TS 38.323 [5].

sdt-DRB-List

Indicates the ID(s) of the DRB(s) that are configured for SDT. If size of the sequence is zero, then the UE assumes that none of the DRBs are configured for SDT. The network only configures MN terminated MCG bearers for SDT.

sdt-SRB2-Indication

Indiates whether SRB2 is configured for SDT or not.

SDT-MAC-PHY-CG-Config field descriptions

cg-SDT-ConfigInitialBWP-DL

Downlink BWP configuration for CG-SDT. If a UE is a RedCap UE and if the *initialDownlinkBWP-RedCap* is configured in *downlinkConfigCommon* in *SIB1*, this field is configured for *initialDownlinkBWP-RedCap*, otherwise it is configured for *initialDownlinkBWP*.

cg-SDT-ConfigInitialBWP-NUL

UL BWP configuration for CG-SDT on NUL carrier. If a UE is a RedCap UE and if the *initialUplinkBWP-RedCap* is configured in *uplinkConfigCommon* in *SIB1*, this field is configured for *initialUplinkBWP-RedCap*, otherwise it is configured for *initialUplinkBWP* for NUL.

cg-SDT-ConfigInitialBWP-SUL

UL BWP configuration for CG-SDT on SUL carrier configured for the initialUplinkBWP for SUL.

cg-SDT-CS-RNTI

The CS-RNTI value for CG-SDT as specified in TS 38.321 [3].

cg-SDT-RSRP-ThresholdSSB

An RSRP threshold configured for SSB selection for CG-SDT as specified in TS 38.321 [3].

ca-SDT-TA-ValidationConfig

Configuration for the RSRP based TA validation. If this field is not configured, then the UE does not perform RSRP based TA validation.

ca-SDT-timeAlianmentTimer

TAT value for CG-SDT as specified in TS 38.321 [3]. The network always configures this field when sdt-MAC-PHY-CG-Config is configured.

CG-SDT-TA-ValidationConfig field descriptions

cg-SDT-RSRP-ChangeThreshold

The RSRP threshold for TA validation for CG-SDT as specified in TS 38.321 [3]. Value dB2 corresponds to 2 dB, value dB4 corresponds to 4 dB and so on.

SRS-PosRRC-InactiveConfig field descriptions

bwp-NUL

BWP configuration for SRS for Positioning during the RRC_INACTIVE state in Normal Uplink Carrier. If the field is absent UE is configured with an SRS for Positioning associated with the initial UL BWP and transmitted, during the RRC_INACTIVE state, inside the initial UL BWP with the same CP and SCS as configured for initial UL BWP.

bwp-SUL

BWP configuration for SRS for Positioning during the RRC_INACTIVE state in Supplementary Uplink Carrier. If the field is absent UE is configured with an SRS for Positioning associated with the initial UL BWP and transmitted, during the RRC_INACTIVE state, inside the initial UL BWP with the same CP and SCS as configured for initial UL BWP.

inactivePosSRS-RSRP-ChangeThreshold

RSRP threshold for the increase/decrease of RSRP for time alignment validation as specified in TS 38.321 [3].

inactivePosSRS-TimeAlignmentTimer

TAT value for SRS for positioning transmission during RRC_INACTIVE state as specified in TS 38.321 [3]. The network always configures this field when *srs-PosRRC-Inactive* is configured.

srs-PosConfigNUL

SRS for Positioning configuration in RRC_INACTIVE state in Normal Uplink Carrier.

srs-PosConfigSUL

SRS for Positioning configuration in RRC_INACTIVE state in Supplementary Uplink Carrier.

SuspendConfig field descriptions

ran-ExtendedPagingCycle

The extended DRX (eDRX) cycle for RAN-initiated paging to be applied by the UE. Value *rf256* corresponds to 256 radio frames, value *rf512* corresponds to 512 radio frames and so on. Value of the field indicates an eDRX cycle which is shorter or equal to the IDLE mode eDRX cycle configured for the UE.

ran-NotificationAreaInfo

Network ensures that the UE in RRC INACTIVE always has a valid ran-NotificationAreaInfo.

ran-PagingCycle

Refers to the UE specific cycle for RAN-initiated paging. Value rf32 corresponds to 32 radio frames, value rf64 corresponds to 64 radio frames and so on.

sI-UEIdentityRemote

Indicates the C-RNTI to the L2 U2N Remote UE.

t380

Refers to the timer that triggers the periodic RNAU procedure in UE. Value min5 corresponds to 5 minutes, value min10 corresponds to 10 minutes and so on.

Conditional Presence	Explanation
L2RemoteUE	The field is mandatory present for L2 U2N Remote UE's RNAU; otherwise it is absent.
RANPaging	This field is optionally present, Need R, if the UE is configured with eDRX in IDLE mode, see TS 24.501 [23]; otherwise the
	field is not present.
Redirection2	The field is optionally present, Need R, if redirectedCarrierInfo is included; otherwise the field is not present.

RRCResume

The RRCResume message is used to resume the suspended RRC connection.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

RRCResume message

```
-- ASN1START
-- TAG-RRCRESUME-START
RRCResume ::=
                                     SEOUENCE {
   rrc-TransactionIdentifier
                                        RRC-TransactionIdentifier,
    criticalExtensions
                                        CHOICE {
       rrcResume
                                            RRCResume-IEs,
                                            SEQUENCE {}
        criticalExtensionsFuture
                                     SEQUENCE {
RRCResume-IEs ::=
    radioBearerConfig
                                        RadioBearerConfig
                                                                                                          OPTIONAL, -- Need M
    masterCellGroup
                                        OCTET STRING (CONTAINING CellGroupConfig)
                                                                                                          OPTIONAL, -- Need M
    measConfig
                                        MeasConfig
                                                                                                          OPTIONAL, -- Need M
                                                                                                          OPTIONAL, -- Need N
    fullConfig
                                        ENUMERATED {true}
    lateNonCriticalExtension
                                        OCTET STRING
                                                                                                          OPTIONAL,
    nonCriticalExtension
                                        RRCResume-v1560-IEs
                                                                                                          OPTIONAL
RRCResume-v1560-IEs ::=
                                    SEQUENCE {
    radioBearerConfig2
                                        OCTET STRING (CONTAINING RadioBearerConfig)
                                                                                                          OPTIONAL, -- Need M
    sk-Counter
                                        SK-Counter
                                                                                                          OPTIONAL, -- Need N
    nonCriticalExtension
                                        RRCResume-v1610-IEs
                                                                                                          OPTIONAL
RRCResume-v1610-IEs ::=
                                     SEOUENCE {
    idleModeMeasurementReg-r16
                                         ENUMERATED {true}
                                                                                                          OPTIONAL, -- Need N
    restoreMCG-SCells-r16
                                        ENUMERATED {true}
                                                                                                          OPTIONAL, -- Need N
                                                                                                          OPTIONAL, -- Need N
    restoreSCG-r16
                                        ENUMERATED {true}
    mrdc-SecondaryCellGroup-r16
                                        CHOICE {
       nr-SCG-r16
                                            OCTET STRING (CONTAINING RRCReconfiguration),
        eutra-SCG-r16
                                            OCTET STRING
                                                                                                          OPTIONAL, -- Cond RestoreSCG
    needForGapsConfigNR-r16
                                        SetupRelease {NeedForGapsConfigNR-r16}
                                                                                                          OPTIONAL, -- Need M
    nonCriticalExtension
                                        RRCResume-v1700-IEs
                                                                                                          OPTIONAL
RRCResume-v1700-IEs ::=
    sl-ConfigDedicatedNR-r17
                                        SetupRelease {SL-ConfigDedicatedNR-r16}
                                                                                                          OPTIONAL, -- Cond L2RemoteUE
                                        SetupRelease {SL-L2RemoteUE-Config-r17}
                                                                                                          OPTIONAL, -- Cond L2RemoteUE
    sl-L2RemoteUE-Config-r17
    needForGapNCSG-ConfigNR-r17
                                        SetupRelease {NeedForGapNCSG-ConfigNR-r17}
                                                                                                          OPTIONAL, -- Need M
    needForGapNCSG-ConfigEUTRA-r17
                                        SetupRelease {NeedForGapNCSG-ConfigEUTRA-r17}
                                                                                                          OPTIONAL, -- Need M
                                        ENUMERATED {deactivated}
                                                                                                          OPTIONAL, -- Need N
    scg-State-r17
    appLayerMeasConfig-r17
                                        AppLayerMeasConfig-r17
                                                                                                          OPTIONAL, -- Need M
    nonCriticalExtension
                                        SEQUENCE {}
                                                                                                          OPTIONAL
```

- -- TAG-RRCRESUME-STOP
- -- ASN1STOP

RRCResume-IEs field descriptions

appLayerMeasConfig

This field is used to configure application layer measurements. This field is absent when the UE is configured to operate with shared spectrum channel access.

idleModeMeasurementReg

This field indicates that the UE shall report the idle/inactive measurements, if available, to the network in the RRCResumeComplete message

masterCellGroup

Configuration of the master cell group.

mrdc-SecondaryCellGroup

Includes an RRC message for SCG configuration in NR-DC or NE-DC.

For NR-DC (*nr-SCG*), *mrdc-SecondaryCellGroup* contains the *RRCReconfiguration* message as generated (entirely) by SN gNB. In this version of the specification, the RRC message can only include fields *secondaryCellGroup* (with at least *reconfigurationWithSync*), *otherConfig* and *measConfig*.

For NE-DC (eutra-SCG), mrdc-SecondaryCellGroup includes the E-UTRA RRCConnectionReconfiguration message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message only include the field scq-Configuration with at least mobilityControlInfoSCG.

needForGapsConfigNR

Configuration for the UE to report measurement gap requirement information of NR target bands in the RRCReconfigurationComplete and RRCResumeComplete message.

needForGapNCSG-ConfigEUTRA

Configuration for the UE to report measurement gap and NCSG requirement information of E-UTRA target bands in the *RRCReconfigurationComplete* and *RRCResumeComplete* message.

needForGapNCSG-ConfigNR

Configuration for the UE to report measurement gap and NCSG requirement information of NR target bands in the RRCReconfigurationComplete and RRCResumeComplete message.

radioBearerConfig

Configuration of Radio Bearers (DRBs, SRBs, multicast MRBs) including SDAP/PDCP.

radioBearerConfig2

Configuration of Radio Bearers (DRBs, SRBs) including SDAP/PDCP. This field can only be used if the UE supports NR-DC or NE-DC.

restoreMCG-SCells

Indicates that the UE shall restore the MCG SCells from the UE Inactive AS Context, if stored.

restoreSCG

Indicates that the UE shall restore the SCG configurations from the UE Inactive AS Context, if stored.

scg-State

Indicates that the SCG is in deactivated state.

sk-Counter

A counter used to derive S-K_{gNB} or S-K_{eNB} based on the newly derived K_{gNB} during RRC Resume. The field is only included when there is one or more RB with *keyToUse* set to *secondary or mrdc-SecondaryCellGroup* is included.

sI-ConfigDedicatedNR

This field is used to provide the dedicated configurations for NR sidelink communication/discovery used by L2 U2N Remote UE.

sI-L2RemoteUE-Config

Contains L2 U2N relay operation related configurations used by L2 U2N Remote UE. The field is absent if appLayerMeasConfig or SRB4 is configured/not released.

Conditional Presence	Explanation
L2RemoteUE	The field is mandatory present for L2 U2N Remote UE; otherwise it is absent.
RestoreSCG	The field is mandatory present if <i>restoreSCG</i> is included. It is optionally present, Need M, otherwise.

RRCResumeComplete

The RRCResumeComplete message is used to confirm the successful completion of an RRC connection resumption.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

RRCResumeComplete message

```
-- ASN1START
-- TAG-RRCRESUMECOMPLETE-START
RRCResumeComplete ::=
                                        SEOUENCE {
    rrc-TransactionIdentifier
                                            RRC-TransactionIdentifier,
    criticalExtensions
                                            CHOICE
                                                RRCResumeComplete-IEs,
       rrcResumeComplete
                                                SEQUENCE {}
        criticalExtensionsFuture
RRCResumeComplete-IEs ::=
                                        SEOUENCE {
    dedicatedNAS-Message
                                            DedicatedNAS-Message
                                                                                                                      OPTIONAL,
    selectedPLMN-Identity
                                            INTEGER (1..maxPLMN)
                                                                                                                      OPTIONAL,
    uplinkTxDirectCurrentList
                                            UplinkTxDirectCurrentList
                                                                                                                      OPTIONAL,
                                            OCTET STRING
    lateNonCriticalExtension
                                                                                                                      OPTIONAL,
    nonCriticalExtension
                                            RRCResumeComplete-v1610-IEs
                                                                                                                      OPTIONAL
RRCResumeComplete-v1610-IEs ::=
                                        SEQUENCE {
    idleMeasAvailable-r16
                                            ENUMERATED {true}
                                                                                                                      OPTIONAL,
   measResultIdleEUTRA-r16
                                            MeasResultIdleEUTRA-r16
                                                                                                                      OPTIONAL.
   measResultIdleNR-r16
                                            MeasResultIdleNR-r16
                                                                                                                      OPTIONAL,
    scg-Response-r16
                                            CHOICE {
       nr-SCG-Response
                                                OCTET STRING (CONTAINING RRCReconfigurationComplete),
        eutra-SCG-Response
                                                OCTET STRING
                                                                                                                      OPTIONAL,
    ue-MeasurementsAvailable-r16
                                            UE-MeasurementsAvailable-r16
                                                                                                                      OPTIONAL,
    mobilityHistoryAvail-r16
                                            ENUMERATED {true}
                                                                                                                      OPTIONAL,
    mobilityState-r16
                                            ENUMERATED {normal, medium, high, spare}
                                                                                                                      OPTIONAL,
    needForGapsInfoNR-r16
                                            NeedForGapsInfoNR-r16
                                                                                                                      OPTIONAL,
```

```
nonCriticalExtension
                                            RRCResumeComplete-v1640-IEs
                                                                                                                    OPTIONAL
                                       SEQUENCE {
RRCResumeComplete-v1640-IEs ::=
    uplinkTxDirectCurrentTwoCarrierList-r16 UplinkTxDirectCurrentTwoCarrierList-r16
                                                                                                                    OPTIONAL.
    nonCriticalExtension
                                            RRCResumeComplete-v1700-IEs
                                                                                                                    OPTIONAL
RRCResumeComplete-v1700-IEs ::=
                                        SEOUENCE {
    needForGapNCSG-InfoNR-r17
                                            NeedForGapNCSG-InfoNR-r17
                                                                                                                    OPTIONAL,
   needForGapNCSG-InfoEUTRA-r17
                                            NeedForGapNCSG-InfoEUTRA-r17
                                                                                                                    OPTIONAL,
   nonCriticalExtension
                                            RRCResumeComplete-v1720-IEs
                                                                                                                    OPTIONAL
RRCResumeComplete-v1720-IEs ::=
                                        SEOUENCE {
    uplinkTxDirectCurrentMoreCarrierList-r17 UplinkTxDirectCurrentMoreCarrierList-r17
                                                                                                                    OPTIONAL,
                                             SEQUENCE {}
    nonCriticalExtension
                                                                                                                    OPTIONAL
-- TAG-RRCRESUMECOMPLETE-STOP
```

RRCResumeComplete-IEs field descriptions

idleMeasAvailable

-- ASN1STOP

Indication that the UE has idle/inactive measurement report available.

measResultIdleEUTRA

EUTRA measurement results performed during RRC INACTIVE.

measResultIdleNR

NR measurement results performed during RRC_INACTIVE.

needForGapsInfoNR

This field is used to indicate the measurement gap requirement information of the UE for NR target bands.

needForGapNCSG-InfoEUTRA

This field is used to indicate the measurement gap and NCSG requirement information of the UE for E-UTRA target bands

needForGapNCSG-InfoNR

This field is used to indicate the measurement gap and NCSG requirement information of the UE for NR target bands

selectedPLMN-Identity

Index of the PLMN selected by the UE from the plmn-IdentityInfoList or npn-IdentityInfoList fields included in SIB1.

uplinkTxDirectCurrentList

The Tx Direct Current locations for the configured serving cells and BWPs if requested by the NW (see reportUplinkTxDirectCurrent in CellGroupConfig).

uplinkTxDirectCurrentMoreCarrierList

The Tx Direct Current locations for the configured intra-band CA requested by reportUplinkTxDirectCurrentMoreCarrier-r17.

uplinkTxDirectCurrentTwoCarrierList

The Tx Direct Current locations for the configured uplink intra-band CA with two carriers if requested by the NW (see reportUplinkTxDirectCurrentTwoCarrier-r16 in CellGroupConfig).

RRCResumeRequest

The RRCResumeRequest message is used to request the resumption of a suspended RRC connection or perform an RNA update.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to Network

RRCResumeRequest message

```
-- ASN1START
-- TAG-RRCRESUMEREQUEST-START
                               SEQUENCE {
RRCResumeRequest ::=
       rrcResumeRequest
                                  RRCResumeRequest-IEs
                         SEQUENCE {
RRCResumeRequest-IEs ::=
   resumeIdentity
                                  ShortI-RNTI-Value,
   resumeMAC-I
                                  BIT STRING (SIZE (16)),
   resumeCause
                                  ResumeCause,
    spare
                                  BIT STRING (SIZE (1))
-- TAG-RRCRESUMEREOUEST-STOP
-- ASN1STOP
```

RRCResumeRequest-IEs field descriptions

resumeCause

Provides the resume cause for the RRC connection resume request as provided by the upper layers or RRC. The network is not expected to reject an *RRCResumeRequest* due to unknown cause value being used by the UE.

resumeldentity

UE identity to facilitate UE context retrieval at gNB.

resumeMAC-I

Authentication token to facilitate UE authentication at gNB. The 16 least significant bits of the MAC-I calculated using the AS security configuration as specified in 5.3.13.3.

– RRCResumeRequest1

The RRCResumeRequest1 message is used to request the resumption of a suspended RRC connection or perform an RNA update.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH1

Direction: UE to Network

RRCResumeRequest1 message

```
-- ASN1START
-- TAG-RRCRESUMEREOUEST1-START
RRCResumeRequest1 ::=
                            SEQUENCE {
      rrcResumeRequest1
                                RRCResumeRequest1-IEs
RRCResumeRequest1-IEs ::= SEQUENCE {
   resumeIdentity I-RNTI-Value,
   resumeMAC-I
                               BIT STRING (SIZE (16)),
   resumeCause
                               ResumeCause,
    spare
                               BIT STRING (SIZE (1))
-- TAG-RRCRESUMEREQUEST1-STOP
-- ASN1STOP
```

RRCResumeRequest1-IEs field descriptions

resumeCause

Provides the resume cause for the RRCResumeRequest1 as provided by the upper layers or RRC. A gNB is not expected to reject an RRCResumeRequest1 due to unknown cause value being used by the UE.

resumeldentity

UE identity to facilitate UE context retrieval at gNB.

resumeMAC-I

Authentication token to facilitate UE authentication at gNB. The 16 least significant bits of the MAC-I calculated using the AS security configuration as specified in 5.3.13.3.

RRCSetup

The RRCSetup message is used to establish SRB1.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: Network to UE

RRCSetup message

```
-- ASN1START
-- TAG-RRCSETUP-START
                                   SEOUENCE {
RRCSetup ::=
                                       RRC-TransactionIdentifier,
   rrc-TransactionIdentifier
                                       CHOICE {
    criticalExtensions
                                           RRCSetup-IEs,
       rrcSetup
       criticalExtensionsFuture
                                           SEOUENCE {}
RRCSetup-IEs ::=
                                   SEOUENCE {
    radioBearerConfig
                                       RadioBearerConfig,
    masterCellGroup
                                       OCTET STRING (CONTAINING CellGroupConfig),
   lateNonCriticalExtension
                                       OCTET STRING
                                                                                                               OPTIONAL,
    nonCriticalExtension
                                       RRCSetup-v1700-IEs
                                                                                                               OPTIONAL
RRCSetup-v1700-IEs ::=
                                   SEOUENCE {
    sl-ConfigDedicatedNR-r17
                                       SL-ConfigDedicatedNR-r16
                                                                                          OPTIONAL, -- Cond L2RemoteUE
                                       SL-L2RemoteUE-Config-r17
    sl-L2RemoteUE-Config-r17
                                                                                          OPTIONAL, -- Cond L2RemoteUE
                                       SEQUENCE {}
    nonCriticalExtension
                                                                                          OPTIONAL
-- TAG-RRCSETUP-STOP
-- ASN1STOP
```

RRCSetup-IEs field descriptions

masterCellGroup

The network configures only the RLC bearer for the SRB1, mac-CellGroupConfig, physicalCellGroupConfig and spCellConfig.

radioBearerConfig

Only SRB1 can be configured in RRC setup.

sI-ConfigDedicatedNR

Contains dedicated configurations for NR sidelink communication. The network configures only the PC5 Relay RLC channel and sI-PHY-MAC-RLC-Config used for the SRB1.

sI-L2RemoteUE-Config

Contains dedicated configurations used for L2 U2N relay related operation. The network configures only the SRAP configuration used for the SRB1 and local UE ID.

Conditional Presence	Explanation
L2RemoteUE	The field is mandatory present for L2 U2N Remote UE; otherwise it is absent.

RRCSetupComplete

The RRCSetupComplete message is used to confirm the successful completion of an RRC connection establishment.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

RRCSetupComplete message

```
-- ASN1START
-- TAG-RRCSETUPCOMPLETE-START
RRCSetupComplete ::=
                                     SEOUENCE {
    rrc-TransactionIdentifier
                                         RRC-TransactionIdentifier,
    criticalExtensions
                                         CHOICE {
                                             RRCSetupComplete-IEs,
        rrcSetupComplete
                                             SEOUENCE {}
        criticalExtensionsFuture
                                     SEQUENCE {
RRCSetupComplete-IEs ::=
    selectedPLMN-Identity
                                         INTEGER (1..maxPLMN),
    registeredAMF
                                        RegisteredAMF
                                                                                          OPTIONAL,
    quami-Type
                                         ENUMERATED {native, mapped}
                                                                                          OPTIONAL,
    s-NSSAI-List
                                        SEQUENCE (SIZE (1..maxNrofS-NSSAI)) OF S-NSSAI OPTIONAL,
    dedicatedNAS-Message
                                         DedicatedNAS-Message,
    ng-5G-S-TMSI-Value
                                        CHOICE {
        ng-5G-S-TMSI
                                             NG-5G-S-TMSI,
        ng-5G-S-TMSI-Part2
                                             BIT STRING (SIZE (9))
                                                                                          OPTIONAL,
    lateNonCriticalExtension
                                        OCTET STRING
                                                                                          OPTIONAL,
    nonCriticalExtension
                                        RRCSetupComplete-v1610-IEs
                                                                                          OPTIONAL
RRCSetupComplete-v1610-IEs ::=
                                     SEQUENCE {
    iab-NodeIndication-r16
                                         ENUMERATED {true}
                                                                                          OPTIONAL,
    idleMeasAvailable-r16
                                         ENUMERATED {true}
                                                                                          OPTIONAL,
                                         UE-MeasurementsAvailable-r16
    ue-MeasurementsAvailable-r16
                                                                                          OPTIONAL,
    mobilityHistoryAvail-r16
                                         ENUMERATED {true}
                                                                                          OPTIONAL,
    mobilityState-r16
                                         ENUMERATED {normal, medium, high, spare}
                                                                                          OPTIONAL,
    nonCriticalExtension
                                        RRCSetupComplete-v1690-IEs
                                                                                          OPTIONAL
RRCSetupComplete-v1690-IEs ::=
                                     SEQUENCE {
    ul-RRC-Segmentation-r16
                                         ENUMERATED {true}
                                                                                          OPTIONAL,
    nonCriticalExtension
                                        RRCSetupComplete-v1700-IEs
                                                                                          OPTIONAL
RRCSetupComplete-v1700-IEs ::=
                                     SEQUENCE {
                                         ENUMERATED {true}
    onboardingRequest-r17
                                                                                          OPTIONAL,
    nonCriticalExtension
                                        SEQUENCE { }
                                                                                          OPTIONAL
```

RRCSetupComplete-IEs field descriptions

guami-Type

This field is used to indicate whether the GUAMI included is native (derived from native 5G-GUTI) or mapped (from EPS, derived from EPS GUTI) as specified in TS 24.501 [23].

iab-NodeIndication

This field is used to indicate that the connection is being established by an IAB-node as specified in TS 38.300 [2].

idleMeasAvailable

Indication that the UE has idle/inactive measurement report available.

mobilityState

This field indicates the UE mobility state (as defined in TS 38.304 [20], clause 5.2.4.3) just prior to UE going into RRC_CONNECTED state. The UE indicates the value of medium and high when being in Medium-mobility and High-mobility states respectively. Otherwise the UE indicates the value normal.

ng-5G-S-TMSI-Part2

The leftmost 9 bits of 5G-S-TMSI.

onboardingRequest

This field indicates that the connection is being established for UE onboarding in the selected onboarding SNPN, see TS 23.501 [32].

registeredAMF

This field is used to transfer the GUAMI of the AMF where the UE is registered, as provided by upper layers, see TS 23.003 [21].

selectedPLMN-Identity

Index of the PLMN or SNPN selected by the UE from the plmn-IdentityInfoList or npn-IdentityInfoList fields included in SIB1.

ul-RRC-Segmentation

This field indicates the UE supports uplink RRC segmentation of UECapabilityInformation.

– RRCSetupRequest

The RRCSetupRequest message is used to request the establishment of an RRC connection.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to Network

RRCSetupRequest message

```
-- ASN1START
-- TAG-RRCSETUPREOUEST-START
RRCSetupRequest ::=
                                    SEOUENCE {
    rrcSetupRequest
                                        RRCSetupRequest-IEs
RRCSetupRequest-IEs ::=
                                    SEQUENCE {
    ue-Identity
                                       InitialUE-Identity,
    establishmentCause
                                        EstablishmentCause,
                                        BIT STRING (SIZE (1))
    spare
InitialUE-Identity ::=
                                   CHOICE {
   ng-5G-S-TMSI-Part1
                                        BIT STRING (SIZE (39)),
    randomValue
                                        BIT STRING (SIZE (39))
EstablishmentCause ::=
                                    ENUMERATED {
                                        emergency, highPriorityAccess, mt-Access, mo-Signalling,
                                        mo-Data, mo-VoiceCall, mo-VideoCall, mo-SMS, mps-PriorityAccess, mcs-PriorityAccess,
                                        spare6, spare5, spare4, spare3, spare2, spare1}
-- TAG-RRCSETUPREOUEST-STOP
```

RRCSetupRequest-IEs field descriptions

establishmentCause

Provides the establishment cause for the *RRCSetupRequest* in accordance with the information received from upper layers. gNB is not expected to reject an *RRCSetupRequest* due to unknown cause value being used by the UE.

ue-Identity

-- ASN1STOP

UE identity included to facilitate contention resolution by lower layers.

InitialUE-Identity field descriptions

ng-5G-S-TMSI-Part1

The rightmost 39 bits of 5G-S-TMSI.

randomValue

Integer value in the range 0 to $2^{39} - 1$.

RRCSystemInfoRequest

The RRCSystemInfoRequest message is used to request SI message(s) required by the UE as specified in clause 5.2.2.3.3 and 5.2.2.3.3a.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to Network

RRCSystemInfoRequest message

```
-- ASN1START
-- TAG-RRCSYSTEMINFOREQUEST-START
RRCSystemInfoRequest ::=
                                    SEQUENCE {
    criticalExtensions
                                       CHOICE {
       rrcSystemInfoRequest
                                           RRCSystemInfoRequest-IEs,
       criticalExtensionsFuture-r16
                                           CHOICE {
           rrcPosSystemInfoRequest-r16
                                               RRC-PosSystemInfoRequest-r16-IEs,
                                               SEQUENCE {}
           criticalExtensionsFuture
RRCSystemInfoRequest-IEs ::=
    requested-SI-List
                                       BIT STRING (SIZE (maxSI-Message)), --32bits
    spare
                                       BIT STRING (SIZE (12))
RRC-PosSystemInfoRequest-r16-IEs ::= SEQUENCE {
    requestedPosSI-List
                                         BIT STRING (SIZE (maxSI-Message)), --32bits
    spare
                                         BIT STRING (SIZE (11))
-- TAG-RRCSYSTEMINFOREQUEST-STOP
-- ASN1STOP
```

RRCSystemInfoRequest-IEs field descriptions

requested-SI-List

Contains a list of requested SI messages which are configured by schedulingInfoList in si-SchedulingInfo and schedulingInfoList2 in si-SchedulingInfo-v1700 (if present) in SIB1.

If *si-SchedulingInfo-v1700* is not present:

According to the order of entry in the list of SI messages configured by schedulingInfoList in si-SchedulingInfo in SIB1, first bit corresponds to first/leftmost listed SI message, second bit corresponds to second listed SI message, and so on.

If si-SchedulingInfo-v1700 is present:

- The UE generates a list of concatenated SI messages by appending the SI messages containing type1 SIB configured by *schedulingInfoList2* in *si-SchedulingInfo.* to the SI messages configured by *schedulingInfoList* in *si-SchedulingInfo*.
- According to the order of entry in the list of concatenated SI messages, first bit corresponds to first/leftmost listed SI message, second bit corresponds to second listed SI message, and so on.

requestedPosSI-List

Contains a list of requested SI messages which are configured by posSchedulingInfoList in posSI-SchedulingInfo and schedulingInfoList2 in si-SchedulingInfo-v1700 (if present) in SIB1.

If *si-SchedulingInfo-v1700* is not present:

- According to the order of entry in the list of SI messages configured by posSchedulingInfoList in posSI-SchedulingInfo in SIB1, first bit corresponds to first/leftmost listed SI message, second bit corresponds to second listed SI message, and so on.

If si-SchedulingInfo-v1700 is present:

- The UE creates a list of concatenated SI messages by appending the SI messages containing type2 SIB configured by schedulingInfoList2 in si-SchedulingInfo-v1700 to the SI messages configured by posSchedulingInfoList in posSI-SchedulingInfo.
- According to the order of entry in the list of concatenated SI messages, first bit corresponds to first/leftmost listed SI message, second bit corresponds to second listed SI message, and so on.

SCGFailureInformation

The SCGFailureInformation message is used to provide information regarding NR SCG failures detected by the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

SCGFailureInformation message

```
-- ASN1START
-- TAG-SCGFAILUREINFORMATION-START

SCGFailureInformation ::= SEQUENCE {
    criticalExtensions CHOICE {
        scgFailureInformation SCGFailureInformation-IEs,
        criticalExtensionsFuture SEQUENCE {}
```

```
SCGFailureInformation-IEs ::=
                                         SEOUENCE {
    failureReportSCG
                                             FailureReportSCG
                                                                                  OPTIONAL,
    nonCriticalExtension
                                              SCGFailureInformation-v1590-IEs
                                                                                  OPTIONAL
SCGFailureInformation-v1590-IEs ::=
                                          SEOUENCE {
    lateNonCriticalExtension
                                            OCTET STRING
                                                                                 OPTIONAL,
    nonCriticalExtension
                                            SEQUENCE {}
                                                                                 OPTIONAL
FailureReportSCG ::=
                                            SEOUENCE {
    failureType
                                                    ENUMERATED
                                                                t310-Expiry, randomAccessProblem,
                                                                rlc-MaxNumRetx,
                                                                synchReconfigFailureSCG, scg-ReconfigFailure,
                                                                srb3-IntegrityFailure, other-r16, spare1},
    measResultFreqList
                                                MeasResultFreqList
                                                                                                                          OPTIONAL,
    measResultSCG-Failure
                                               OCTET STRING (CONTAINING MeasResultSCG-Failure)
                                                                                                                OPTIONAL,
    11
   locationInfo-r16
                                                LocationInfo-r16
                                                                             OPTIONAL,
   failureType-v1610
                                            ENUMERATED {scg-lbtFailure-r16, beamFailureRecoveryFailure-r16,
                                                         t312-Expiry-r16, bh-RLF-r16, beamFailure-r17, spare3, spare2, spare1} OPTIONAL
    ]],
    ] ]
    previousPSCellId-r17
                                       SEQUENCE {
                                            PhysCellId,
        physCellId-r17
       carrierFreq-r17
                                           ARFCN-ValueNR
                                                                 OPTIONAL,
    failedPSCellId-r17
                                       SEQUENCE {
       physCellId-r17
                                            PhysCellId,
        carrierFreq-r17
                                           ARFCN-ValueNR
                                                                 OPTIONAL,
    timeSCGFailure-r17
                                       INTEGER (0..1023)
                                                                 OPTIONAL,
    perRAInfoList-r17
                                       PerRAInfoList-r16
                                                                   OPTIONAL
    ]]
MeasResultFreqList ::=
                                         SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2NR
-- TAG-SCGFAILUREINFORMATION-STOP
-- ASN1STOP
```

SCGFailureInformation field descriptions

measResultFreqList

The field contains available results of measurements on NR frequencies the UE is configured to measure by measConfig.

measResultSCG-Failure

The field contains the MeasResultSCG-Failure IE which includes available results of measurements on NR frequencies the UE is configured to measure by the NR SCG RRCReconfiguration message.

previousPSCellId

This field indicates the physical cell id and carrier frequency of the cell that is the source PSCell of the last PSCell change.

failedPSCellId

This field indicates the physical cell id and carrier frequency of the cell in which SCG failure is detected or the target PSCell of the failed PSCell change or failed PSCell addition.

timeSCGFailure

This field is used to indicate the time elapsed since the last execution of *RRCReconfiguration* with *reconfigurationWithSync* for the SCG until the SCG failure. Actual value = field value * 100ms. The maximum value 1023 means 102.3s or longer.

SCGFailureInformationEUTRA

The SCGFailureInformationEUTRA message is used to provide information regarding E-UTRA SCG failures detected by the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

SCGFailureInformationEUTRA message

```
-- ASN1START
-- TAG-SCGFAILUREINFORMATIONEUTRA-START
SCGFailureInformationEUTRA ::=
                                              SEQUENCE {
    criticalExtensions
                                                      CHOICE {
        scgFailureInformationEUTRA
                                                         SCGFailureInformationEUTRA-IEs,
        criticalExtensionsFuture
                                                          SEOUENCE {}
SCGFailureInformationEUTRA-IEs ::=
                                             SEQUENCE {
    failureReportSCG-EUTRA
                                                     FailureReportSCG-EUTRA
                                                                                                  OPTIONAL,
    nonCriticalExtension
                                                      SCGFailureInformationEUTRA-v1590-IEs
                                                                                                                               OPTIONAL
SCGFailureInformationEUTRA-v1590-IEs ::= SEQUENCE {
    lateNonCriticalExtension
                                              OCTET STRING
                                                                      OPTIONAL,
                                                       SEOUENCE {}
    nonCriticalExtension
                                                                                    OPTIONAL
```

```
FailureReportSCG-EUTRA ::=
                                                 SEOUENCE
    failureType
                                                           ENUMERATED {
                                                                        t313-Expiry, randomAccessProblem,rlc-MaxNumRetx,
                                                                           scg-ChangeFailure, spare4,
                                                                           spare3, spare2, spare1},
    measResultFreqListMRDC
                                                       MeasResultFreqListFailMRDC
                                                                                                                                      OPTIONAL.
    measResultSCG-FailureMRDC
                                                      OCTET STRING
                                                                                                                             OPTIONAL.
    locationInfo-r16
                                                         LocationInfo-r16
                                                                                                                                   OPTIONAL
    11
MeasResultFreqListFailMRDC ::=
                                    SEQUENCE (SIZE (1.. maxFreg)) OF MeasResult2EUTRA
-- TAG-SCGFAILUREINFORMATIONEUTRA-STOP
-- ASN1STOP
```

SCGFailureInformationEUTRA field descriptions

measResultFreqListMRDC

The field contains available results of measurements on E-UTRA frequencies the UE is configured to measure by measConfig.

measResultSCG-FailureMRDC

Includes the E-UTRA MeasResultSCG-FailureMRDC IE as specified in TS 36.331 [10]. The field contains available results of measurements on E-UTRA frequencies the UE is configured to measure by the E-UTRA RRCConnectionReconfiguration message.

SecurityModeCommand

The SecurityModeCommand message is used to command the activation of AS security.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

SecurityModeCommand message

```
-- ASN1START
-- TAG-SECURITYMODECOMMAND-START

SecurityModeCommand ::= SEQUENCE {
    rrc-TransactionIdentifier RRC-TransactionIdentifier,
    criticalExtensions CHOICE {
        securityModeCommand SecurityModeCommand-IEs,
        criticalExtensionsFuture SEQUENCE {}
```

OPTIONAL, OPTIONAL

SecurityModeComplete

The SecurityModeComplete message is used to confirm the successful completion of a security mode command.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

${\it Security Mode Complete}\ message$

```
-- ASN1START
-- TAG-SECURITYMODECOMPLETE-START
SecurityModeComplete ::=
                                    SEQUENCE {
   rrc-TransactionIdentifier
                                       RRC-TransactionIdentifier,
    criticalExtensions
                                        CHOICE {
       ticalExtensions
securityModeComplete
                                            SecurityModeComplete-IEs,
        criticalExtensionsFuture
                                            SEQUENCE {}
SecurityModeComplete-IEs ::=
                                    SEQUENCE {
                                       OCTET STRING
    lateNonCriticalExtension
    nonCriticalExtension
                                        SEQUENCE { }
-- TAG-SECURITYMODECOMPLETE-STOP
-- ASN1STOP
```

OPTIONAL,

SecurityModeFailure

The SecurityModeFailure message is used to indicate an unsuccessful completion of a security mode command.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

SecurityModeFailure message

```
-- ASN1START
-- TAG-SECURITYMODEFAILURE-START
SecurityModeFailure ::=
                                         SEQUENCE {
   rrc-TransactionIdentifier RRC
criticalExtensions CHO
securityModeFailure
criticalExtensionsFuture
                                            RRC-TransactionIdentifier,
                                             CHOICE {
                                                  SecurityModeFailure-IEs,
                                                  SEOUENCE {}
SecurityModeFailure-IEs ::=
                                        SEQUENCE {
    lateNonCriticalExtension
                                       OCTET STRING
                                                                                                                                OPTIONAL,
    nonCriticalExtension
                                             SEQUENCE { }
                                                                                                                                OPTIONAL
-- TAG-SECURITYMODEFAILURE-STOP
-- ASN1STOP
```

- SIB1

SIB1 contains information relevant when evaluating if a UE is allowed to access a cell and defines the scheduling of other system information. It also contains radio resource configuration information that is common for all UEs and barring information applied to the unified access control.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH

Direction: Network to UE

SIB1 message

```
-- ASN1START
-- TAG-SIB1-START
STB1 ::=
               SEOUENCE {
    cellSelectionInfo
                                        SEQUENCE {
                                           Q-RxLevMin,
       q-RxLevMin
       q-RxLevMinOffset
                                           INTEGER (1..8)
                                                                                                        OPTIONAL, -- Need S
       q-RxLevMinSUL
                                           O-RxLevMin
                                                                                                        OPTIONAL, -- Need R
                                                                                                        OPTIONAL, -- Need S
       q-OualMin
                                           O-OualMin
       q-OualMinOffset
                                           INTEGER (1..8)
                                                                                                        OPTIONAL -- Need S
                                                                                                        OPTIONAL, -- Cond Standalone
                                       CellAccessRelatedInfo,
    cellAccessRelatedInfo
    connEstFailureControl
                                       ConnEstFailureControl
                                                                                                        OPTIONAL, -- Need R
    si-SchedulingInfo
                                        SI-SchedulingInfo
                                                                                                        OPTIONAL, -- Need R
    servingCellConfigCommon
                                        ServingCellConfigCommonSIB
                                                                                                        OPTIONAL. -- Need R
                                                                                                        OPTIONAL, -- Need R
                                        ENUMERATED {true}
    ims-EmergencySupport
    eCallOverIMS-Support
                                       ENUMERATED {true}
                                                                                                        OPTIONAL, -- Need R
    ue-TimersAndConstants
                                                                                                        OPTIONAL, -- Need R
                                       UE-TimersAndConstants
    uac-BarringInfo
                                       SEOUENCE {
       uac-BarringForCommon
                                           UAC-BarringPerCatList
                                                                                                           OPTIONAL, -- Need S
       uac-BarringPerPLMN-List
                                           UAC-BarringPerPLMN-List
                                                                                                           OPTIONAL, -- Need S
       uac-BarringInfoSetList
                                           UAC-BarringInfoSetList,
       uac-AccessCategoryl-SelectionAssistanceInfo CHOICE {
           plmnCommon
                                                UAC-AccessCategoryl-SelectionAssistanceInfo,
            individual PLMNList.
                                                 SEQUENCE (SIZE (2..maxPLMN)) OF UAC-AccessCategory1-SelectionAssistanceInfo
                                                                                                           OPTIONAL -- Need S
                                                                                                        OPTIONAL, -- Need R
    useFullResumeID
                                       ENUMERATED {true}
                                                                                                        OPTIONAL, -- Need R
    lateNonCriticalExtension
                                        OCTET STRING
                                                                                                        OPTIONAL,
    nonCriticalExtension
                                       SIB1-v1610-IEs
                                                                                                        OPTIONAL
SIB1-v1610-IEs ::=
                                SEOUENCE {
    idleModeMeasurementsEUTRA-r16
                                    ENUMERATED { true }
                                                                                                        OPTIONAL, -- Need R
    idleModeMeasurementsNR-r16
                                    ENUMERATED{true}
                                                                                                        OPTIONAL, -- Need R
                                                                                                        OPTIONAL, -- Need R
    posSI-SchedulingInfo-r16
                                    PosSI-SchedulingInfo-r16
    nonCriticalExtension
                                    SIB1-v1630-IEs
                                                                                                        OPTIONAL
SIB1-v1630-IEs ::=
                                SEOUENCE {
    uac-BarringInfo-v1630
                                    SEOUENCE {
       uac-AC1-SelectAssistInfo-r16
                                        SEQUENCE (SIZE (2..maxPLMN)) OF UAC-AC1-SelectAssistInfo-r16
                                                                                                        OPTIONAL, -- Need R
    nonCriticalExtension
                                    STB1-v1700-TES
                                                                                                        OPTIONAL
SIB1-v1700-IEs ::=
                                SEOUENCE {
                                        ENUMERATED {true}
                                                                                                        OPTIONAL, -- Need R
    hsdn-Cell-r17
    uac-BarringInfo-v1700
                                        SEQUENCE {
       uac-BarringInfoSetList-v1700
                                             UAC-BarringInfoSetList-v1700
                                                                                                        OPTIONAL, -- Cond MINT
    sdt-ConfigCommon-r17
                                        SDT-ConfigCommonSIB-r17
                                                                                                        OPTIONAL, -- Need R
```

```
redCap-ConfigCommon-r17
                                        RedCap-ConfigCommonSIB-r17
                                                                                                     OPTIONAL, -- Need R
    featurePriorities-r17
                                SEQUENCE {
       redCapPriority-r17
                                   FeaturePriority-r17
                                                                                                     OPTIONAL. -- Need R
       slicingPriority-r17
                                   FeaturePriority-r17
                                                                                                     OPTIONAL, -- Need R
       msq3-Repetitions-Priority-r17 FeaturePriority-r17
                                                                                                     OPTIONAL, -- Need R
       sdt-Priority-r17
                                   FeaturePriority-r17
                                                                                                     OPTIONAL -- Need R
                                                                                                     OPTIONAL, -- Need R
    si-SchedulingInfo-v1700
                                SI-SchedulingInfo-v1700
                                                                                                     OPTIONAL, -- Need R
   hyperSFN-r17
                                BIT STRING (SIZE (10))
                                                                                                     OPTIONAL, -- Need R
                                ENUMERATED {true}
                                                                                                     OPTIONAL, -- Need R
    eDRX-AllowedIdle-r17
    eDRX-AllowedInactive-r17
                                ENUMERATED {true}
                                                                                                     OPTIONAL, -- Cond EDRX-RC
   intraFreqReselectionRedCap-r17 ENUMERATED {allowed, notAllowed}
                                                                                                     OPTIONAL, -- Need S
                                ENUMERATED {barred, notBarred}
                                                                                                     OPTIONAL, -- Need S
   cellBarredNTN-r17
   nonCriticalExtension
                                SEOUENCE {}
                                                                                                     OPTIONAL
UAC-AccessCategory1-SelectionAssistanceInfo ::=
                                                 ENUMERATED {a, b, c}
                                   ENUMERATED {a, b, c, notConfigured}
UAC-AC1-SelectAssistInfo-r16 ::=
SDT-ConfigCommonSIB-r17 ::=
                                    SEQUENCE {
    sdt-RSRP-Threshold-r17
                                        RSRP-Range
                                                                                                            OPTIONAL, -- Need R
    sf20, sf40, sf64, sf128, sf512, sf1024, sf2560, spare1} OPTIONAL, -- Need R
    sdt-DataVolumeThreshold-r17
                                        ENUMERATED {byte32, byte100, byte200, byte400, byte600, byte800, byte1000, byte2000, byte4000,
                                                   byte8000, byte9000, byte10000, byte12000, byte24000, byte48000, byte96000},
    t.319a-r17
                                        ENUMERATED { ms100, ms200, ms300, ms400, ms600, ms1000, ms2000,
                                                    ms3000, ms4000, spare7, spare6, spare5, spare4, spare3, spare2, spare1}
RedCap-ConfigCommonSIB-r17 ::= SEQUENCE {
   halfDuplexRedCapAllowed-r17
                                 ENUMERATED {true}
                                                                                                     OPTIONAL, -- Need R
   cellBarredRedCap-r17
                                  SEQUENCE {
       cellBarredRedCap1Rx-r17
                                      ENUMERATED {barred, notBarred},
                                     ENUMERATED {barred, notBarred}
       cellBarredRedCap2Rx-r17
                                                                                                     OPTIONAL, -- Need R
FeaturePriority-r17 ::= INTEGER (0..7)
-- TAG-SIB1-STOP
-- ASN1STOP
```

SIB1 field descriptions

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cellBarredNTN

Value *barred* means that the cell is barred for connectivity to NTN, as defined in TS 38.304 [20]. Value *notBarred* means that the cell is allowed for connectivity to NTN. If not present, the UE considers the cell is not allowed for connectivity to NTN, as defined in TS 38.304 [20]. This field is only applicable to NTN-capable UEs.

cellBarredRedCap1Rx

Value barred means that the cell is barred for a RedCap UE with 1 Rx branch, as defined in TS 38.304 [20]. This field is ignored by non-RedCap UEs.

cellBarredRedCap2Rx

Value barred means that the cell is barred for a RedCap UE with 2 Rx branches, as defined in TS 38.304 [20]. This field is ignored by non-RedCap UEs.

cellSelectionInfo

Parameters for cell selection related to the serving cell.

eCallOverIMS-Support

Indicates whether the cell supports eCall over IMS services as defined in TS 23.501 [32]. If absent, eCall over IMS is not supported by the network in the cell.

eDRX-AllowedIdle

The presence of this field indicates that extended DRX for CN paging is allowed in the cell for UEs in RRC_IDLE or RRC_INACTIVE. The UE shall stop using extended DRX for CN paging in RRC_IDLE or RRC_INACTIVE if eDRX-AllowedIdle is not present.

eDRX-AllowedInactive

The presence of this field indicates that extended DRX for RAN paging is allowed in the cell for UEs in RRC_INACTIVE. The UE shall stop using extended DRX for RAN paging in RRC_INACTIVE if eDRX-AllowedInactive is not present.

featurePriorities

Indicates priorities for features, such as RedCap, Slicing, SDT and MSG3-Repetitions for Coverage Enhancements. These priorities are used to determine which FeatureCombinationPreambles the UE shall use when a feature maps to more than one FeatureCombinationPreambles, as specified in TS 38.321 [3]. A lower value means a higher priority. The network does not signal the same priority for more than one feature. The network signals a priority for all feature that map to at least one FeatureCombinationPreambles.

halfDuplexRedCap-Allowed

The presence of this field indicates that the cell supports half-duplex FDD RedCap UEs.

hsdn-Cell

This field indicates this is a HSDN cell as specified in TS 38.304 [20].

hvperSFN

Indicates hyper SFN which increments by one when the SFN wraps around.

idleModeMeasurementsEUTRA

This field indicates that a UE that is configured for EUTRA idle/inactive measurements shall perform the measurements while camping in this cell and report availability of these measurements when establishing or resuming a connection in this cell. If absent, a UE is not required to perform EUTRA idle/inactive measurements.

idleModeMeasurementsNR

This field indicates that a UE that is configured for NR idle/inactive measurements shall perform the measurements while camping in this cell and report availability of these measurements when establishing or resuming a connection in this cell. If absent, a UE is not required to perform NR idle/inactive measurements.

ims-EmergencySupport

Indicates whether the cell supports IMS emergency bearer services for UEs in limited service mode. If absent, IMS emergency call is not supported by the network in the cell for UEs in limited service mode.

intraFreqReselectionRedCap

Controls cell selection/reselection to intra-frequency cells for RedCap UEs when this cell is barred, or treated as barred by the RedCap UE, as specified in TS 38.304 [20]. If not present, a RedCap UE treats the cell as barred, i.e., the UE considers that the cell does not support RedCap.

g-QualMin

Parameter "Q_{qualmin}" in TS 38.304 [20], applicable for serving cell. If the field is absent, the UE applies the (default) value of negative infinity for Q_{qualmin}.

q-QualMinOffset

Parameter "Q_{qualminoffset}" in TS 38.304 [20]. Actual value Q_{qualminoffset} = field value [dB]. If the field is absent, the UE applies the (default) value of 0 dB for Q_{qualminoffset}. Affects the minimum required quality level in the cell.

g-RxLevMin

Parameter "Q_{rxlevmin}" in TS 38.304 [20], applicable for serving cell.

q-RxLevMinOffset

Parameter "Q_{rxlevminoffset}" in TS 38.304 [20]. Actual value Q_{rxlevminoffset} = field value * 2 [dB]. If absent, the UE applies the (default) value of 0 dB for Q_{rxlevminoffset}. Affects the minimum required Rx level in the cell.

q-RxLevMinSUL

Parameter "Q_{rxlevmin}" in TS 38.304 [20], applicable for serving cell.

sdt-RSRP-Threshold

RSRP threshold used to determine whether SDT procedure can be initiated, as specified in TS 38.321 [3].

sdt-DataVolumeThreshold

Data volume threshold used to determine whether SDT can be initiated, as specified in TS 38.321 [3]. Value *byte32* corresponds to 32 bytes, value *byte100* corresponds to 100 bytes, and so on.

sdt-LogicalChannelSR-DelayTimer

The value of *logicalChannelSR-DelayTimer* applied during SDT for logical channels configured with SDT, as specified in TS 38.321 [3]. Value in number of subframes. Value *sf20* corresponds to 20 subframes, *sf40* corresponds to 40 subframes, and so on. If this field is not configured, then logicalChannelSR-DelayTimer is not applied for SDT logical channels.

servingCellConfigCommon

Configuration of the serving cell.

t319a

Initial value of the timer T319a used for detection of SDT failure. Value ms100 corresponds to 100 milliseconds, value ms200 corresponds to 200 milliseconds and so on.

uac-AccessCategory1-SelectionAssistanceInfo

Information used to determine whether Access Category 1 applies to the UE, as defined in TS 22.261 [25]. If plmnCommon is chosen, the UAC-AccessCategory1-SelectionAssistanceInfo is applicable to all the PLMNs and SNPNs in plmn-IdentityInfoList and npn-IdentityInfoList. If individualPLMNList is chosen, the 1st corresponds to the first network within all of the PLMNs and SNPNs across the plmn-IdentityList and the npn-IdentityInfoList, the 2nd entry in the list corresponds to the second network within all of the PLMNs and SNPNs across the plmn-IdentityList and the npn-IdentityInfoList and so on. If uac-AC1-SelectAssistInfo-r16 is present, the UE shall ignore the uac-AccessCategory1-SelectionAssistanceInfo.

uac-AC1-SelectAssistInfo

Information used to determine whether Access Category 1 applies to the UE, as defined in TS 22.261 [25]. The 1st entry in the list corresponds to the first network within all of the PLMNs and SNPNs across the *plmn-IdentityList* and *npn-IdentityInfoList*, the 2nd entry in the list corresponds to the second network within all of the PLMNs and SNPNs across the *plmn-IdentityList* and the *npn-IdentityInfoList* and so on. Value *notConfigured* indicates that Access Category1 is not configured for the corresponding PLMN/SNPN.

uac-BarringForCommon

Common access control parameters for each access category. Common values are used for all PLMNs/SNPNs, unless overwritten by the PLMN/SNPN specific configuration provided in *uac-BarringPerPLMN-List*. The parameters are specified by providing an index to the set of configurations (*uac-BarringInfoSetList*). UE behaviour upon absence of this field is specified in clause 5.3.14.2.

ue-TimersAndConstants

Timer and constant values to be used by the UE. The cell operating as PCell always provides this field.

useFullResumeID

Indicates which resume identifier and Resume request message should be used. UE uses *fullI-RNTI* and *RRCResumeRequest1* if the field is present, or *shortI-RNTI* and *RRCResumeRequest* if the field is absent.

OPTIONAL,

OPTIONAL,

OPTIONAL,

OPTIONAL,

OPTIONAL,

OPTIONAL,

OPTIONAL,

OPTIONAL,

OPTIONAL

Conditional Presence	Explanation
EDRX-RC	The field is optionally present, Need R, in a cell that enables eDRX-AllowedIdle, otherwise it is absent.
MINT	The field is optionally present, Need R, in a cell that provides a configuration for disaster roaming, otherwise it is absent, Need R.
Standalone	The field is mandatory present in a cell that supports standalone operation, otherwise it is absent.

SidelinkUEInformationNR

The SidelinkUEinformationNR message is used for the indication of NR sidelink UE information to the network.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

SidelinkUEInformationNR message

```
-- ASN1START
-- TAG-SIDELINKUEINFORMATIONNR-START
SidelinkUEInformationNR-r16::=
                                       SEQUENCE {
    criticalExtensions
                                        CHOICE {
        sidelinkUEInformationNR-r16
                                            SidelinkUEInformationNR-r16-IEs,
        criticalExtensionsFuture
                                            SEQUENCE {}
SidelinkUEInformationNR-r16-IEs ::=
                                       SEQUENCE {
    sl-RxInterestedFreqList-r16
                                           SL-InterestedFreqList-r16
                                                                                OPTIONAL,
    sl-TxResourceReqList-r16
                                           SL-TxResourceReqList-r16
                                                                                OPTIONAL,
    sl-FailureList-r16
                                           SL-FailureList-r16
                                                                                OPTIONAL,
    lateNonCriticalExtension
                                           OCTET STRING
                                                                                OPTIONAL,
    nonCriticalExtension
                                           SidelinkUEInformationNR-v1700-IEs
                                                                                OPTIONAL
SidelinkUEInformationNR-v1700-IEs ::= SEQUENCE {
    sl-TxResourceRegList-v1700
                                           SL-TxResourceRegList-v1700
                                           SL-RxDRX-ReportList-v1700
    sl-RxDRX-ReportList-v1700
    sl-RxInterestedGC-BC-DestList-r17
                                           SL-RxInterestedGC-BC-DestList-r17
    sl-RxInterestedFreqListDisc-r17
                                           SL-InterestedFreqList-r16
    sl-TxResourceReqListDisc-r17
                                           SL-TxResourceRegListDisc-r17
    sl-TxResourceReqListCommRelay-r17
                                           SL-TxResourceReqListCommRelay-r17
                                           ENUMERATED {relayUE, remoteUE}
    ue-Type-r17
    sl-SourceIdentityRemoteUE-r17
                                           SL-SourceIdentity-r17
    nonCriticalExtension
                                           SEQUENCE {}
```

```
SL-InterestedFreqList-r16 ::=
                                       SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF INTEGER (1..maxNrofFreqSL-r16)
SL-TxResourceRegList-r16 ::=
                                       SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-TxResourceReg-r16
SL-TxResourceReg-r16 ::=
                                       SEOUENCE {
    sl-DestinationIdentity-r16
                                           SL-DestinationIdentity-r16,
    sl-CastTvpe-r16
                                           ENUMERATED {broadcast, groupcast, unicast, spare1},
    sl-RLC-ModeIndicationList-r16
                                           SEQUENCE (SIZE (1.. maxNrofSLRB-r16)) OF SL-RLC-ModeIndication-r16
                                                                                                                       OPTIONAL,
                                           SEQUENCE (SIZE (1..maxNrofSL-QFIsPerDest-r16)) OF SL-QoS-Info-r16
    sl-OoS-InfoList-r16
                                                                                                                       OPTIONAL,
    sl-TypeTxSyncList-r16
                                           SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-TypeTxSync-r16
                                                                                                                       OPTIONAL,
    sl-TxInterestedFreqList-r16
                                           SL-TxInterestedFreqList-r16
                                                                                                                       OPTIONAL,
    sl-CapabilityInformationSidelink-r16 OCTET STRING
                                                                                                                       OPTIONAL
SL-TxResourceRegList-v1700 ::=
                                       SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-TxResourceReq-v1700
SL-RxDRX-ReportList-v1700 ::=
                                       SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-RxDRX-Report-v1700
SL-TxResourceReq-v1700 ::=
                                       SEQUENCE {
    sl-DRX-InfoFromRxList-r17
                                           SEQUENCE (SIZE (1..maxNrofSL-RxInfoSet-r17)) OF SL-DRX-ConfigUC-SemiStatic-r17
                                                                                                                             OPTIONAL,
    sl-DRX-Indication-r17
                                           ENUMERATED {on, off}
                                                                                                                             OPTIONAL,
SL-RxDRX-Report-v1700 ::=
                                       SEOUENCE {
    sl-DRX-ConfigFromTx-r17
                                           SL-DRX-ConfigUC-SemiStatic-r17,
    . . . }
SL-RxInterestedGC-BC-DestList-r17 ::= SEOUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-RxInterestedGC-BC-Dest-r17
SL-RxInterestedGC-BC-Dest-r17 ::=
                                       SEQUENCE {
    sl-RxInterestedOoS-InfoList-r17
                                           SEQUENCE (SIZE (1..maxNrofSL-QFIsPerDest-r16)) OF SL-QoS-Info-r16,
    sl-DestinationIdentity-r16
                                           SL-DestinationIdentity-r16
SL-TxResourceReqListDisc-r17 ::=
                                       SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-TxResourceReqDisc-r17
SL-TxResourceReqDisc-r17 ::=
                                       SEOUENCE {
    sl-DestinationIdentityDisc-r17
                                           SL-DestinationIdentity-r16,
    sl-SourceIdentityRelayUE-r17
                                           SL-SourceIdentity-r17
                                                                                                                       OPTIONAL,
    sl-CastTypeDisc-r17
                                           ENUMERATED {broadcast, groupcast, unicast, spare1},
    sl-TxInterestedFreqListDisc-r17
                                           SL-TxInterestedFreqList-r16,
    sl-TypeTxSyncListDisc-r17
                                           SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-TypeTxSync-r16,
                                           ENUMERATED {relay, non-Relay},
    sl-DiscoveryType-r17
SL-TxResourceReqListCommRelay-r17 ::= SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-TxResourceReqCommRelayInfo-r17
SL-TxResourceReqCommRelayInfo-r17 ::= SEQUENCE {
    sl-RelayDRXConfig-r17
                                          SL-TxResourceReq-v1700
                                                                                                                        OPTIONAL,
    sl-TxResourceReqCommRelay-r17
                                          SL-TxResourceReqCommRelay-r17
```

```
SL-TxResourceRegCommRelay-r17 ::=
                                       CHOICE {
    sl-TxResourceRegL2U2N-Relay-r17
                                            SL-TxResourceRegL2U2N-Relay-r17,
    sl-TxResourceRegL3U2N-Relay-r17
                                           SL-TxResourceReg-r16
SL-TxResourceRegL2U2N-Relay-r17 ::=
                                       SEQUENCE {
    sl-DestinationIdentityL2U2N-r17
                                           SL-DestinationIdentity-r16
                                                                                                                       OPTIONAL,
    sl-TxInterestedFreqListL2U2N-r17
                                           SL-TxInterestedFreqList-r16,
    sl-TypeTxSyncListL2U2N-r17
                                           SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-TypeTxSync-r16,
    sl-LocalID-Request-r17
                                           ENUMERATED {true}
                                                                                                                       OPTIONAL,
    sl-PagingIdentityRemoteUE-r17
                                           SL-PagingIdentityRemoteUE-r17
                                                                                                                       OPTIONAL,
    sl-CapabilityInformationSidelink-r17 OCTET STRING
                                                                                                                       OPTIONAL,
SL-TxInterestedFreqList-r16 ::=
                                       SEQUENCE (SIZE (1..maxNrofFregSL-r16)) OF INTEGER (1..maxNrofFregSL-r16)
SL-OoS-Info-r16 ::=
                                       SEOUENCE {
    sl-QoS-FlowIdentity-r16
                                          SL-QoS-FlowIdentity-r16,
    sl-QoS-Profile-r16
                                          SL-OoS-Profile-r16
                                                                                                                       OPTIONAL.
SL-RLC-ModeIndication-r16 ::=
                                       SEOUENCE {
    sl-Mode-r16
                                           CHOICE
        sl-AM-Mode-r16
                                               NULL,
        sl-UM-Mode-r16
                                               NULL
    sl-OoS-InfoList-r16
                                       SEQUENCE (SIZE (1..maxNrofSL-OFIsPerDest-r16)) OF SL-OoS-Info-r16
SL-FailureList-r16 ::=
                                       SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-Failure-r16
SL-Failure-r16 ::=
                                       SEQUENCE {
    sl-DestinationIdentity-r16
                                           SL-DestinationIdentity-r16,
    sl-Failure-r16
                                           ENUMERATED {rlf,configFailure, drxReject-v1710, spare5, spare4, spare3, spare2, spare1}
-- TAG-SIDELINKUEINFORMATIONNR-STOP
-- ASN1STOP
```

SidelinkUEinformationNR field descriptions

sI-RxDRX-ReportList

Indicates the accepted DRX configuration that is received from the peer UE and reported to the network for NR sidelink unicast communication.

sl-RxInterestedFreqList

Indicates the index of frequency on which the UE is interested to receive NR sidelink communication. The value 1 corresponds to the frequency of first entry in *sl-FreqInfoList* broadcast in *SIB12*, the value 2 corresponds to the frequency of second entry in *sl-FreqInfoList* broadcast in *SIB12* and so on. In this release, only value 1 can be included in the interested frequency list.

sI-RxInterestedGC-BC-DestList

Indicates the reported QoS profile and associated destination for which UE is interested in reception to the network for NR sidelink groupcast and broadcast communication, or for NR sidelink discovery or ProSe Direct Link Establishment Request as described in TS 24.554 [72], or for Direct Link Establishment Request (TS 24.587 [57]).

sl-SourceldentityRemoteUE

This field is used to indicate the Source Layer-2 ID to be used to establish PC5 link with the target L2 U2N Relay UE for path switch.

sI-TxResourceReq

Parameters to request the transmission resources for NR sidelink communication to the network in the Sidelink UE Information report.

sI-TxResourceReqList

List of parameters to request the transmission resources for NR sidelink communication for the associated destination. If *sl-TxResourceReqList-v1700* is present, it shall contain the same number of entries, listed in the same order as in *sl-TxResourceReqList* (without suffix).

ue-Type

Indicates the UE is acting as U2N Relay UE or U2N Remote UE.

SL-TxResourceReg field descriptions

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sl-CapabilityInformationSidelink

Includes the UECapabilityInformationSidelink message (which can be also included in ueCapabilityInformationSidelink-r16 in UECapabilityEnquirySidelink from peer UE) received from the peer UE.

sl-CastType

Indicates the cast type for the corresponding destination for which to request the resource.

sl-DestinationIdentity

Indicates the destination for which the TX resource request and allocation from the network are concerned.

sI-DRX-Indication

Indicates the sidelink DRX is applied (value on) or not applied (value off) for the associated destination. This field is only valid for NR sidelink groupcast communication.

sI-DRX-InfoFromRxList

Indicates list of the sidelink DRX configurations as assistance information received from the peer UE for NR sidelink unicast communication.

sI-QoS-InfoList

Includes the QoS profile of the sidelink QoS flow as specified in TS 23.287 [55].

sI-QoS-FlowIdentity

This identity uniquely identifies one sidelink QoS flow between the UE and the network in the scope of UE, which is unique for different destination and cast type.

sI-RLC-ModeIndication

This field indicates the RLC mode and optionally the related QoS profiles for the sidelink radio bearer, which has not been configured by the network and is initiated by another UE in unicast. The RLC mode for one sidelink radio bearer is aligned between UE and NW by the sI-QoS-FlowIdentity.

sI-TxInterestedFreaList

Each entry of this field indicates the index of frequency on which the UE is interested to transmit NR sidelink communication. The value 1 corresponds to the frequency of first entry in *sl-FreqInfoList* broadcast in *SIB12*, the value 2 corresponds to the frequency of second entry in *sl-FreqInfoList* broadcast in *SIB12* and so on. In this release, only value 1 can be included in the interested frequency list. In this release, only one entry can be included in the list.

sl-TypeTxSyncList

A list of synchronization reference used by the UE. The UE shall include the same number of entries, listed in the same order, as in sl-TxInterestedFreqList, i.e. one for each carrier frequency included in sl-TxInterestedFreqList.

SL-Failure field descriptions

sl-DestinationIdentity

Indicates the destination for which the SL failure is reporting for unicast.

sl-Failure

Indicates the sidelink cause for the sidelink RLF (value *rlf*), sidelink AS configuration failure (value *configFailure*) and the rejection of sidelink DRX configuration (value *drxReject-v1710*) for the associated destination for unicast.

SL-RxDRX-Report field descriptions

sI-DRX-ConfigFromTx

Indicates the sidelink DRX configuration received from the peer UE for NR sidelink unicast communication.

SL-RxInterestedGC-BC-Dest field descriptions

sl-RxInterestedQoS-InfoList

Indicates the QoS profile for which UE reports its interested service to which SL DRX is applied to the network, for NR sidelink groupcast or broadcast reception.

SL-TxResourceReqDisc field descriptions

sI-CastTypeDisc

Indicates the cast type for the NR sidelink discovery messages. Only value broadcast can be set in this release.

sI-DestinationIdentityDisc

This field is used to indicate the destination L2 ID for which the TX resource request and allocation from the network are concerned for relay discovery and non-relay discovery.

sl-SourceldentityRelayUE

This field is used to indicate the source L2 ID of relay-related discovery transmission by L2 U2N Relay UE.

sl-TxInterestedFreqListDisc

Each entry of this field indicates the index of frequency on which the UE is interested to transmit NR sidelink discovery. The value 1 corresponds to the frequency of first entry in *sl-FreqInfoList* broadcast in *SIB12*, the value 2 corresponds to the frequency of second entry in *sl-FreqInfoList* broadcast in *SIB12* and so on. In this release, only value 1 can be included in the interested frequency list. In this release, only one entry can be included in the list.

SL-TxResourceReqCommRelayInfo field descriptions

sI-RelayDRXConfig

This field is used to indicate the applied sidelink DRX configuration for the relay related communication.

sI-DestinationIdentityL2U2N

This field is used to indicate the destination L2 ID for which the TX resource request and allocation from the network are concerned for the established PC5 link for relay by L2 U2N Relay UE, or L3 U2N Remote UE.

sl-LocalID-Request

This field is used to request local UE ID for the corresponding destination by the L2 U2N Relay UE.

sI-TxInterestedFreaListL2U2N

Each entry of this field indicates the index of frequency on which the UE is interested to transmit NR sidelink communication for established PC5 link for relay. The value 1 corresponds to the frequency of first entry in *sl-FreqInfoList* broadcast in SIB12, the value 2 corresponds to the frequency of second entry in *sl-FreqInfoList* broadcast in SIB12 and so on. In this release, only value 1 can be included in the interested frequency list. In this release, only one entry can be included in the list.

sI-PagingIdentityRemoteUE

This field is used to indicate the paging UE ID(s) for the corresponding destination(s) by the L2 U2N Relay UE.

SystemInformation

The *SystemInformation* message is used to convey one or more System Information Blocks or Positioning System Information Blocks. All the SIBs or posSIBs included are transmitted with the same periodicity.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH

Direction: Network to UE

SystemInformation message

⁻⁻ ASN1START

⁻⁻ TAG-SYSTEMINFORMATION-START

```
SystemInformation ::=
                                     SEQUENCE {
                                         CHOICE {
    criticalExtensions
        systemInformation
                                             SystemInformation-IEs,
        criticalExtensionsFuture-r16
            posSystemInformation-r16
                                             PosSystemInformation-r16-IEs,
            criticalExtensionsFuture
                                             SEQUENCE {}
SystemInformation-IEs ::=
                                     SEQUENCE {
    sib-TypeAndInfo
                                         SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {
        sib2
                                             SIB2,
        sib3
                                             SIB3,
        sib4
                                             SIB4,
        sib5
                                             SIB5,
        sib6
                                             SIB6,
        sib7
                                             SIB7,
        sib8
                                             SIB8,
        sib9
                                             SIB9,
        sib10-v1610
                                             SIB10-r16,
        sib11-v1610
                                             SIB11-r16,
        sib12-v1610
                                             SIB12-r16,
        sib13-v1610
                                             SIB13-r16,
        sib14-v1610
                                             SIB14-r16,
        sib15-v1700
                                             SIB15-r17,
        sib16-v1700
                                             SIB16-r17,
        sib17-v1700
                                             SIB17-r17,
        sib18-v1700
                                             SIB18-r17,
        sib19-v1700
                                             SIB19-r17,
        sib20-v1700
                                             SIB20-r17,
        sib21-v1700
                                             SIB21-r17
    lateNonCriticalExtension
                                         OCTET STRING
                                                                              OPTIONAL,
    nonCriticalExtension
                                         SEQUENCE {}
                                                                              OPTIONAL
-- TAG-SYSTEMINFORMATION-STOP
-- ASN1STOP
```

UEAssistanceInformation

The UEAssistanceInformation message is used for the indication of UE assistance information to the network.

Signalling radio bearer: SRB1, SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

UEAssistanceInformation message

```
-- ASN1START
-- TAG-UEASSISTANCEINFORMATION-START
UEAssistanceInformation ::=
                                    SEQUENCE {
    criticalExtensions
                                        CHOICE {
       ueAssistanceInformation
                                            UEAssistanceInformation-IEs,
        criticalExtensionsFuture
                                            SEOUENCE {}
UEAssistanceInformation-IEs ::=
                                    SEOUENCE {
    delayBudgetReport
                                        DelayBudgetReport
                                                                             OPTIONAL,
    lateNonCriticalExtension
                                        OCTET STRING
                                                                             OPTIONAL,
    nonCriticalExtension
                                        UEAssistanceInformation-v1540-IEs
                                                                             OPTIONAL
DelayBudgetReport::=
                                     CHOICE {
    type1
                                        ENUMERATED
                                            msMinus1280, msMinus640, msMinus320, msMinus160, msMinus80, msMinus60, msMinus40,
                                            msMinus20, ms0, ms20,ms40, ms60, ms80, ms160, ms320, ms640, ms1280},
UEAssistanceInformation-v1540-IEs ::= SEQUENCE {
    overheatingAssistance
                                        OverheatingAssistance
                                                                             OPTIONAL,
    nonCriticalExtension
                                        UEAssistanceInformation-v1610-IEs
                                                                             OPTIONAL
OverheatingAssistance ::=
                                     SEQUENCE {
    reducedMaxCCs
                                        ReducedMaxCCs-r16
                                                                             OPTIONAL,
    reducedMaxBW-FR1
                                        ReducedMaxBW-FRx-r16
                                                                             OPTIONAL,
                                        ReducedMaxBW-FRx-r16
    reducedMaxBW-FR2
                                                                             OPTIONAL,
                                        SEOUENCE {
    reducedMaxMIMO-LayersFR1
        reducedMIMO-LayersFR1-DL
                                            MIMO-LayersDL,
        reducedMIMO-LayersFR1-UL
                                            MIMO-LayersUL
    } OPTIONAL,
    reducedMaxMIMO-LayersFR2
                                        SEQUENCE {
        reducedMIMO-LayersFR2-DL
                                            MIMO-LayersDL,
       reducedMIMO-LayersFR2-UL
                                            MIMO-LayersUL
    } OPTIONAL
OverheatingAssistance-r17 ::=
                                    SEQUENCE {
    reducedMaxBW-FR2-2-r17
        reducedBW-FR2-2-DL-r17
                                            ReducedAggregatedBandwidth-r17,
        reducedBW-FR2-2-UL-r17
                                            ReducedAggregatedBandwidth-r17
    } OPTIONAL,
    reducedMaxMIMO-LayersFR2-2
                                        SEQUENCE {
        reducedMIMO-LayersFR2-2-DL
                                            MIMO-LayersDL,
       reducedMIMO-LayersFR2-2-UL
                                            MIMO-LayersUL
```

```
} OPTIONAL
ReducedAggregatedBandwidth ::= ENUMERATED {mhz0, mhz10, mhz20, mhz40, mhz50, mhz60, mhz80, mhz100, mhz200, mhz300, mhz400}
ReducedAggregatedBandwidth-r17 ::= ENUMERATED {mhz0, mhz100, mhz400, mhz400, mhz800, mhz1200, mhz1600, mhz2000}
UEAssistanceInformation-v1610-IEs ::= SEOUENCE {
    idc-Assistance-r16
                                        IDC-Assistance-r16
                                                                             OPTIONAL,
    drx-Preference-r16
                                        DRX-Preference-r16
                                                                             OPTIONAL.
    maxBW-Preference-r16
                                        MaxBW-Preference-r16
                                                                             OPTIONAL,
    maxCC-Preference-r16
                                        MaxCC-Preference-r16
                                                                             OPTIONAL,
    maxMIMO-LaverPreference-r16
                                        MaxMIMO-LaverPreference-r16
                                                                             OPTIONAL.
    minSchedulingOffsetPreference-r16
                                        MinSchedulingOffsetPreference-r16
                                                                             OPTIONAL,
    releasePreference-r16
                                        ReleasePreference-r16
                                                                             OPTIONAL,
    sl-UE-AssistanceInformationNR-r16
                                        SL-UE-AssistanceInformationNR-r16
                                                                             OPTIONAL,
    referenceTimeInfoPreference-r16
                                        BOOLEAN
                                                                             OPTIONAL,
    nonCriticalExtension
                                        UEAssistanceInformation-v1700-IEs
                                                                             OPTIONAL
UEAssistanceInformation-v1700-IEs ::= SEQUENCE {
    ul-GapFR2-Preference-r17
                                          UL-GapFR2-Preference-r17
                                                                                 OPTIONAL,
    musim-Assistance-r17
                                          MUSIM-Assistance-r17
                                                                                 OPTIONAL,
    overheatingAssistance-r17
                                          OverheatingAssistance-r17
                                                                                 OPTIONAL.
    maxBW-PreferenceFR2-2-r17
                                          MaxBW-PreferenceFR2-2-r17
                                                                                 OPTIONAL,
    maxMIMO-LayerPreferenceFR2-2-r17
                                          MaxMIMO-LayerPreferenceFR2-2-r17
                                                                                 OPTIONAL,
    minSchedulingOffsetPreferenceExt-r17
                                          MinSchedulingOffsetPreferenceExt-r17 OPTIONAL,
    rlm-MeasRelaxationState-r17
                                           BOOLEAN
                                                                                 OPTIONAL,
    bfd-MeasRelaxationState-r17
                                          BIT STRING (SIZE (1..maxNrofServingCells)) OPTIONAL,
    nonSDT-DataIndication-r17
                                           SEOUENCE {
        resumeCause-r17
                                               ResumeCause
                                                                                 OPTIONAL
                                                                                 OPTIONAL,
    scg-DeactivationPreference-r17
                                           ENUMERATED { scgDeactivationPreferred, noPreference }
                                                                                                    OPTIONAL,
    uplinkData-r17
                                           ENUMERATED { true }
                                                                                 OPTIONAL,
    rrm-MeasRelaxationFulfilment-r17
                                           BOOLEAN
                                                                                 OPTIONAL.
                                          PropagationDelayDifference-r17
    propagationDelayDifference-r17
                                                                                 OPTIONAL.
    nonCriticalExtension
                                           SEOUENCE {}
                                                                                 OPTIONAL
IDC-Assistance-r16 ::=
                                         SEOUENCE {
                                            AffectedCarrierFreqList-r16
    affectedCarrierFreqList-r16
                                                                                       OPTIONAL,
    affectedCarrierFregCombList-r16
                                            AffectedCarrierFreqCombList-r16
                                                                                       OPTIONAL,
    . . .
AffectedCarrierFreqList-r16 ::= SEQUENCE (SIZE (1.. maxFreqIDC-r16)) OF AffectedCarrierFreq-r16
AffectedCarrierFreq-r16 ::=
                                SEOUENCE {
    carrierFreg-r16
                                    ARFCN-ValueNR,
    interferenceDirection-r16
                                     ENUMERATED {nr, other, both, spare}
AffectedCarrierFreqCombList-r16 ::= SEQUENCE (SIZE (1..maxCombIDC-r16)) OF AffectedCarrierFreqComb-r16
```

```
AffectedCarrierFregComb-r16 ::=
                                     SEOUENCE {
    affectedCarrierFregComb-r16
                                        SEQUENCE (SIZE (2..maxNrofServingCells)) OF ARFCN-ValueNR
                                                                                                        OPTIONAL.
    victimSystemType-r16
                                        VictimSystemType-r16
VictimSystemType-r16 ::=
                            SEOUENCE {
    qps-r16
                                ENUMERATED {true}
                                                          OPTIONAL,
    glonass-r16
                                ENUMERATED
                                            {true}
                                                          OPTIONAL,
    bds-r16
                                ENUMERATED
                                            {true}
                                                          OPTIONAL,
    galileo-r16
                                ENUMERATED
                                            {true}
                                                          OPTIONAL,
    navIC-r16
                                ENUMERATED {true}
                                                          OPTIONAL,
    wlan-r16
                                ENUMERATED {true}
                                                          OPTIONAL,
                                ENUMERATED {true}
    bluetooth-r16
                                                          OPTIONAL,
DRX-Preference-r16 ::=
                                     SEOUENCE {
    preferredDRX-InactivityTimer-r16
                                        ENUMERATED
                                            ms0, ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60, ms80,
                                            ms100, ms200, ms300, ms500, ms750, ms1280, ms1920, ms2560, spare9, spare8,
                                            spare7, spare6, spare5, spare4, spare3, spare2, spare1} OPTIONAL,
    preferredDRX-LongCycle-r16
                                        ENUMERATED {
                                            ms10, ms20, ms32, ms40, ms60, ms64, ms70, ms80, ms128, ms160, ms256, ms320, ms512,
                                            ms640, ms1024, ms1280, ms2048, ms2560, ms5120, ms10240, spare12, spare11, spare10,
                                            spare9, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1 } OPTIONAL,
    preferredDRX-ShortCycle-r16
                                        ENUMERATED
                                            ms2, ms3, ms4, ms5, ms6, ms7, ms8, ms10, ms14, ms16, ms20, ms30, ms32,
                                            ms35, ms40, ms64, ms80, ms128, ms160, ms256, ms320, ms512, ms640, spare9,
                                            spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1 } OPTIONAL,
                                        INTEGER (1..16)
    preferredDRX-ShortCycleTimer-r16
                                                          OPTIONAL
MaxBW-Preference-r16 ::=
                                     SEOUENCE {
    reducedMaxBW-FR1-r16
                                        ReducedMaxBW-FRx-r16
                                                                                  OPTIONAL,
    reducedMaxBW-FR2-r16
                                        ReducedMaxBW-FRx-r16
                                                                                  OPTIONAL
MaxBW-PreferenceFR2-2-r17 ::=
                                     SEOUENCE {
    reducedMaxBW-FR2-2-r17
                                        SEOUENCE
       reducedBW-FR2-2-DL-r17
                                            ReducedAggregatedBandwidth-r17
                                                                                  OPTIONAL,
        reducedBW-FR2-2-UL-r17
                                            ReducedAggregatedBandwidth-r17
                                                                                  OPTIONAL
    } OPTIONAL
MaxCC-Preference-r16 ::=
                                     SEOUENCE {
                                        ReducedMaxCCs-r16
    reducedMaxCCs-r16
                                                                                  OPTIONAL
MaxMIMO-LayerPreference-r16 ::=
                                     SEOUENCE {
    reducedMaxMIMO-LayersFR1-r16
                                        SEOUENCE {
        reducedMIMO-LayersFR1-DL-r16
                                            INTEGER (1..8),
        reducedMIMO-LayersFR1-UL-r16
                                            INTEGER (1..4)
    } OPTIONAL,
    reducedMaxMIMO-LayersFR2-r16
                                        SEQUENCE {
```

```
reducedMIMO-LayersFR2-DL-r16
                                             INTEGER (1..8),
        reducedMIMO-LayersFR2-UL-r16
                                             INTEGER (1..4)
     OPTIONAL
MaxMIMO-LayerPreferenceFR2-2-r17 ::=
                                         SEOUENCE {
    reducedMaxMIMO-LayersFR2-2-r17
                                             SEOUENCE {
        reducedMIMO-LaversFR2-2-DL-r17
                                                 INTEGER (1..8),
        reducedMIMO-LayersFR2-2-UL-r17
                                                 INTEGER (1..4)
    } OPTIONAL
MinSchedulingOffsetPreference-r16 ::= SEQUENCE {
    preferredK0-r16
                                           SEQUENCE {
        preferredK0-SCS-15kHz-r16
                                               ENUMERATED {sl1, sl2, sl4, sl6}
                                                                                             OPTIONAL,
        preferredK0-SCS-30kHz-r16
                                               ENUMERATED {s11, s12, s14, s16}
                                                                                             OPTIONAL,
        preferredK0-SCS-60kHz-r16
                                               ENUMERATED {s12, s14, s18, s112
                                                                                             OPTIONAL,
        preferredK0-SCS-120kHz-r16
                                               ENUMERATED {s12, s14, s18, s112}
                                                                                             OPTIONAL
                                                                                         OPTIONAL,
    preferredK2-r16
                                           SEQUENCE {
        preferredK2-SCS-15kHz-r16
                                               ENUMERATED {sl1, sl2, sl4, sl6}
                                                                                            OPTIONAL,
                                               ENUMERATED {s11, s12, s14, s16}
        preferredK2-SCS-30kHz-r16
                                                                                            OPTIONAL,
        preferredK2-SCS-60kHz-r16
                                               ENUMERATED {s12, s14, s18, s112
                                                                                            OPTIONAL,
        preferredK2-SCS-120kHz-r16
                                               ENUMERATED {s12, s14, s18, s112}
                                                                                            OPTIONAL
                                                                                        OPTIONAL
MinSchedulingOffsetPreferenceExt-r17 ::= SEQUENCE {
    preferredK0-r17
        preferredK0-SCS-480kHz-r17
                                                   ENUMERATED {s18, s116, s132, s148}
                                                                                            OPTIONAL,
        preferredK0-SCS-960kHz-r17
                                                   ENUMERATED {s18, s116, s132, s148}
                                                                                            OPTIONAL
                                                                                            OPTIONAL,
    preferredK2-r17
                                               SEQUENCE {
                                                   ENUMERATED {s18, s116, s132, s148}
        preferredK2-SCS-480kHz-r17
                                                                                            OPTIONAL,
        preferredK2-SCS-960kHz-r17
                                                   ENUMERATED {s18, s116, s132, s148}
                                                                                            OPTIONAL
                                                                                            OPTIONAL
                                       SEQUENCE
MUSIM-Assistance-r17 ::=
    musim-PreferredRRC-State-r17
                                           ENUMERATED {idle, inactive, outOfConnected}
                                                                                            OPTIONAL,
                                           MUSIM-GapPreferenceList-r17
    musim-GapPreferenceList-r17
                                                                                            OPTIONAL
MUSIM-GapPreferenceList-r17 ::= SEQUENCE (SIZE (1..4)) OF MUSIM-GapInfo-r17
ReleasePreference-r16 ::=
                                     SEOUENCE {
    preferredRRC-State-r16
                                         ENUMERATED {idle, inactive, connected, outOfConnected}
ReducedMaxBW-FRx-r16 ::=
                                     SEOUENCE {
    reducedBW-DL-r16
                                         ReducedAggregatedBandwidth,
    reducedBW-UL-r16
                                        ReducedAggregatedBandwidth
```

```
ReducedMaxCCs-r16 ::=
   reducedCCsDL-r16
                                        INTEGER (0..31),
    reducedCCsUL-r16
                                        INTEGER (0..31)
SL-UE-AssistanceInformationNR-r16 ::= SEOUENCE (SIZE (1..maxNrofTrafficPattern-r16)) OF SL-TrafficPatternInfo-r16
SL-TrafficPatternInfo-r16::=
                                     SEOUENCE {
    trafficPeriodicity-r16
                                         ENUMERATED {ms20, ms50, ms100, ms200, ms300, ms400, ms500, ms600, ms700, ms800, ms900, ms1000},
                                    INTEGER (U....BIT STRING (SIZE (8)),
    timingOffset-r16
    messageSize-r16
    sl-QoS-FlowIdentity-r16
                                         SL-QoS-FlowIdentity-r16
UL-GapFR2-Preference-r17::=
                                      SEQUENCE {
    ul-GapFR2-PatternPreference-r17
                                         INTEGER (0..3)
                                                                             OPTIONAL
PropagationDelayDifference-r17 ::= SEQUENCE (SIZE (1..4)) OF INTEGER (-270..270)
-- TAG-UEASSISTANCEINFORMATION-STOP
-- ASN1STOP
```

Editor's note: The value range for ReducedAggregatedBandwidth-r17 needs RAN4 confirmation

Editor's note: The value range for preferred K0/K2 for SCS 960 kHz needs RAN1 confirmation

UEAssistanceInformation field descriptions

affectedCarrierFreqList

Indicates a list of NR carrier frequencies that are affected by IDC problem.

affectedCarrierFreqCombList

Indicates a list of NR carrier frequencie combinations that are affected by IDC problems due to Inter-Modulation Distortion and harmonics from NR when configured with UL CA.

bfd-MeasRelaxationState

Indicates the relaxation state of BFD measurements. Each bit corresponds to a serving cell of the cell group. A serving cell is mapped to the (*servCellIndex+1*)-th bit, starting from MSB. A bit that is set to 1 indicates that the UE is performing BFD measurements relaxation on the serving cell mapped on the bit. A bit that is set to 0 indicates that the UE is not performing BFD measurements relaxation on the serving cell is not configured to the UE, the corresponding bit is set to 0.

delayBudgetReport

Indicates the UE-preferred adjustment to connected mode DRX.

interferenceDirection

Indicates the direction of IDC interference. Value *nr* indicates that only NR is victim of IDC interference, value *other* indicates that only another radio is victim of IDC interference and value *both* indicates that both NR and another radio are victims of IDC interference. The other radio refers to either the ISM radio or GNSS (see TR 36.816 [44]).

minSchedulingOffsetPreference

Indicates the UE's preferences on minimumSchedulingOffset of cross-slot scheduling for power saving.

minSchedulingOffsetPreferenceExt

Indicates the UE's preferences on minimumSchedulingOffset of cross-slot scheduling for power saving for SCS 480 kHz and/or 960 kHz.

musim-GapPreferenceList

Indicates the UE's MUSIM gap preference and related MUSIM gap configuration, as defined in TS 38.133 [14] clause 9.1.10.

musim-PreferredRRC-State

Indicates the UE's preferred RRC state when leaving RRC CONNECTED.

nonSDT-DataIndication

Informs the network about the arrival of data and/or signaling mapped to radio bearers not configured for SDT while SDT procedure is ongoing.

preferredDRX-InactivityTimer

Indicates the UE's preferred DRX inactivity timer length for power saving. Value in ms (milliSecond). *ms0* corresponds to 0, *ms1* corresponds to 1 ms, *ms2* corresponds to 2 ms, and so on. If the field is absent from the *DRX-Preference* IE, it is interpreted as the UE having no preference for the DRX inactivity timer. If secondary DRX group is configured, the *preferredDRX-InactivityTimer* only applies to the default DRX group.

preferredDRX-LongCycle

Indicates the UE's preferred long DRX cycle length for power saving. Value in ms. ms10 corresponds to 10ms, ms20 corresponds to 20 ms, ms32 corresponds to 32 ms, and so on. If preferredDRX-ShortCycle is provided, the value of preferredDRX-LongCycle shall be a multiple of the preferredDRX-ShortCycle value. If the field is absent from the DRX-Preference IE, it is interpreted as the UE having no preference for the long DRX cycle.

preferredDRX-ShortCycle

Indicates the UE's preferred short DRX cycle length for power saving. Value in ms. ms2 corresponds to 2ms, ms3 corresponds to 3 ms, ms4 corresponds to 4 ms, and so on. If the field is absent from the DRX-Preference IE, it is interpreted as the UE having no preference for the short DRX cycle.

preferredDRX-ShortCvcleTimer

Indicates the UE's preferred short DRX cycle timer for power saving. Value in multiples of *preferredDRX-ShortCycle*. A value of 1 corresponds to *preferredDRX-ShortCycle* and so on. If the field is absent from the *DRX-Preference* IE, it is interpreted as the UE having no preference for the short DRX cycle timer. A preference for the short DRX cycle is indicated when a preference for the short DRX cycle timer is indicated.

preferredK0

Indicates the UE's preferred value of *k0* (slot offset between DCI and its scheduled PDSCH - see TS 38.214 [19], clause 5.1.2.1) for cross-slot scheduling for power saving. Value is defined for each subcarrier spacing (numerology) in units of slots. *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, *sl4* corresponds to 4 slots, and so on. If a value for a subcarrier spacing is absent, it is interpreted as the UE having no preference on *k0* for cross-slot scheduling for that subcarrier spacing. If the field is absent from the *MinSchedulingOffsetPreference* IE, it is interpreted as the UE having no preference on *k0* for cross-slot scheduling.

UEAssistanceInformation field descriptions

preferredK2

Indicates the UE's preferred value of *k2* (slot offset between DCI and its scheduled PUSCH - see TS 38.214 [19], clause 6.1.2.1) for cross-slot scheduling for power saving. Value is defined for each subcarrier spacing (numerology) in units of slots. *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, *sl4* corresponds to 4 slots, and so on. If a value for a subcarrier spacing is absent, it is interpreted as the UE having no preference on *k2* for cross-slot scheduling for that subcarrier spacing. If the field is absent from the *MinSchedulingOffsetPreference* IE, it is interpreted as the UE having no preference on *k2* for cross-slot scheduling.

preferredRRC-State

Indicates the UE's preferred RRC state. The value *idle* is indicated if the UE prefers to be released from RRC_CONNECTED and transition to RRC_IDLE. The value *inactive* is indicated if the UE prefers to be released from RRC_CONNECTED and transition to RRC_INACTIVE. The value *connected* is indicated if the UE prefers to revert an earlier indication to leave RRC_CONNECTED state. The value *outOfConnected* is indicated if the UE prefers to be released from RRC_CONNECTED and has no preferred RRC state to transition to. The value *connected* can only be indicated if the UE is configured with *connectedReporting*.

propagationDelayDifference

Indicates the service link propagation delay difference between serving cell and each neighbour cell included in *neighCellInfoList*, defined as neighbour cell's service link propagation delay minus serving cell's service link propagation delay, in number of ms. First entry in *propagationDelayDifference* corresponds to first entry in *neighCellInfoList*, second entry in *propagationDelayDifference* corresponds to second entry in *neighCellInfoList*, and so on.

reducedBW-FR1

Indicates the UE's preference on reduced configuration corresponding to the maximum aggregated bandwidth across all downlink carrier(s) and across all uplink carrier(s) of FR1, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cell(s) operating on FR1. The aggregated bandwidth across all downlink carrier(s) of FR1 is the sum of bandwidth of active downlink BWP(s) across all activated downlink carrier(s) of FR1. The aggregated bandwidth across all uplink carrier(s) of FR1 is the sum of bandwidth of active uplink BWP(s) across all activated uplink carrier(s) of FR1. If the field is absent from the *MaxBW-Preference* IE or the *OverheatingAssistance* IE, it is interpreted as the UE having no preference on the maximum aggregated bandwidth of FR1.

When indicated to address overheating, this maximum aggregated bandwidth includes carrier(s) of FR1 of both the NR MCG and the SCG. This maximum aggregated bandwidth only includes carriers of FR1 of the SCG in (NG)EN-DC. Value *mhz0* is not used when indicated to address overheating.

When indicated to address power saving, this maximum aggregated bandwidth includes carrier(s) of FR1 of the cell group that this UE assistance information is associated with. The aggregated bandwidth can only range up to the current active configuration when indicated to address power savings.

reducedBW-FR2

Indicates the UE's preference on reduced configuration corresponding to the maximum aggregated bandwidth across all downlink carrier(s) and across all uplink carrier(s) of FR2-1, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cell(s) operating on FR2-1. The aggregated bandwidth across all downlink carrier(s) of FR2-1 is the sum of bandwidth of active downlink BWP(s) across all activated downlink carrier(s) of FR2-1. The aggregated bandwidth across all uplink carrier(s) of FR2-1 is the sum of bandwidth of active uplink BWP(s) across all activated uplink carrier(s) of FR2-1. If the field is absent from the MaxBW-Preference IE or the OverheatingAssistance IE, it is interpreted as the UE having no preference on the maximum aggregated bandwidth of FR2-1.

When indicated to address overheating, this maximum aggregated bandwidth includes carrier(s) of FR2-1 of both the NR MCG and the NR SCG. This maximum aggregated bandwidth only includes carriers of FR2-1 of the SCG in (NG)EN-DC.

When indicated to address power saving, this maximum aggregated bandwidth includes carrier(s) of FR2-1 of the cell group that this UE assistance information is associated with. The aggregated bandwidth can only range up to the current active configuration when indicated to address power savings.

reducedMaxBW-FR2-2

Indicates the UE's preference on reduced configuration corresponding to the maximum aggregated bandwidth across all downlink carrier(s) and across all uplink carrier(s) of FR2-2, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cell(s) operating on FR2-2. The aggregated bandwidth across all downlink carrier(s) of FR2-2 is the sum of bandwidth of active downlink BWP(s) across all activated downlink carrier(s) of FR2-2. The aggregated bandwidth across all uplink carrier(s) of FR2-2 is the sum of bandwidth of active uplink BWP(s) across all activated uplink carrier(s) of FR2-2. If the field is absent from the *MaxBW-PreferenceFR2-2* IE or the *OverheatingAssistance* IE, it is interpreted as the UE having no preference on the maximum aggregated bandwidth of FR2-2. When indicated to address overheating, this maximum aggregated bandwidth includes carrier(s) of FR2-2 of both the NR MCG and the NR SCG. This maximum aggregated bandwidth only includes carriers of FR2-2 of the SCG in (NG)EN-DC.

When indicated to address power saving, this maximum aggregated bandwidth includes carrier(s) of FR2-2 of the cell group that this UE assistance information is associated with. The aggregated bandwidth can only range up to the current active configuration when indicated to address power savings.

UEAssistanceInformation field descriptions

reducedCCsDL

Indicates the UE's preference on reduced configuration corresponding to the maximum number of downlink SCells indicated by the field, to address overheating or power saving.

When indicated to address overheating, this maximum number includes both SCells of the NR MCG and PSCell/SCells of the SCG. This maximum number only includes PSCell/SCells of the SCG in (NG)EN-DC.

When indicated to address power saving, this maximum number includes PSCell/SCells of the cell group that this UE assistance information is associated with. The maximum number of downlink SCells can only range up to the current active configuration when indicated to address power savings.

reducedCCsUL

Indicates the UE's preference on reduced configuration corresponding to the maximum number of uplink SCells indicated by the field, to address overheating or power saving. When indicated to address overheating, this maximum number includes both SCells of the NR MCG and PSCell/SCells of the SCG. This maximum number only includes PSCell/SCells of the SCG in (NG)EN-DC.

When indicated to address power saving, this maximum number includes PSCell/SCells of the cell group that this UE assistance information is associated with. The maximum number of uplink SCells can only range up to the current active configuration when indicated to address power savings.

reducedMIMO-LayersFR1-DL

Indicates the UE's preference on reduced configuration corresponding to the maximum number of downlink MIMO layers of each serving cell operating on FR1 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR1. The maximum number of downlink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated downlink carrier(s) of FR1 in the cell group when indicated to address power savings.

reducedMIMO-LayersFR1-UL

Indicates the UE's preference on reduced configuration corresponding to the maximum number of uplink MIMO layers of each serving cell operating on FR1 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR1. The maximum number of uplink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated uplink carrier(s) of FR1 in the cell group when indicated to address power savings.

reducedMIMO-LayersFR2-DL

Indicates the UE's preference on reduced configuration corresponding to the maximum number of downlink MIMO layers of each serving cell operating on FR2-1 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR2-1. The maximum number of downlink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated downlink carrier(s) of FR2-1 in the cell group when indicated to address power savings.

reducedMIMO-LayersFR2-UL

Indicates the UE's preference on reduced configuration corresponding to the maximum number of uplink MIMO layers of each serving cell operating on FR2-1 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR2-1. The maximum number of uplink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated uplink carrier(s) of FR2-1 in the cell group when indicated to address power savings.

reducedMIMO-LayersFR2-2-DL

Indicates the UE's preference on reduced configuration corresponding to the maximum number of downlink MIMO layers of each serving cell operating on FR2-2 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR2-2. The maximum number of downlink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated downlink carrier(s) of FR2-2 in the cell group when indicated to address power savings.

reducedMIMO-LayersFR2-2-UL

Indicates the UE's preference on reduced configuration corresponding to the maximum number of uplink MIMO layers of each serving cell operating on FR2-2 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR2-2. The maximum number of uplink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated uplink carrier(s) of FR2-2 in the cell group when indicated to address power savings.

referenceTimeInfoPreference

Indicates whether the UE prefers being provisioned with the timing information specified in the IE Reference Time Info.

UEAssistanceInformation field descriptions

resumeCause

Provides the resume cause based on the information received from the upper layers.

rlm-MeasRelaxationState

Indicates the relaxation state of RLM measurements. Value *true* indicates that the UE is performing relaxation of RLM measurements, and value *false* indicates that the UE is not performing relaxation of RLM measurements.

rrm-MeasRelaxationFulfilment

Indicates whether the UE fulfils the relaxed measurement criterion for stationary UE in 5.7.4.4. Value true indicates that the UE fulfils the criterion, and value false indicates that the UE does not fulfil the criterion.

sI-QoS-FlowIdentity

This identity uniquely identifies one sidelink QoS flow between the UE and the network in the scope of UE, which is unique for different destination and cast type.

sI-UE-AssistanceInformationNR

Indicates the traffic characteristic of sidelink logical channel(s), specified in the IE SL-TrafficPatternInfo, that are setup for NR sidelink communication.

type1

Indicates the preferred amount of increment/decrement to the long DRX cycle length with respect to the current configuration. Value in number of milliseconds. Value *ms40* corresponds to 40 milliseconds, *msMinus40* corresponds to -40 milliseconds and so on.

ul-GapFR2-PatternPreference

Indicates the UE's preference on FR2 UL gap pattern as defined in TS 38.133 [14].

victimSystemType

Indicate the list of victim system types to which IDC interference is caused from NR when configured with UL CA. Value *gps*, *glonass*, *bds*, *galileo* and *navIC* indicates the type of GNSS. Value *wlan* indicates WLAN and value *bluetooth* indicates Bluetooth.

SL-TrafficPatternInfo field descriptions

messageSize

Indicates the maximum TB size based on the observed traffic pattern. The value refers to the index of TS 38.321 [3], table 6.1.3.1-2.

timingOffset

This field indicates the estimated timing for a packet arrival in a sidelink logical channel. Specifically, the value indicates the timing offset with respect to subframe#0 of SFN#0 in milliseconds.

trafficPeriodicity

This field indicates the estimated data arrival periodicity in a sidelink logical channel. Value ms20 corresponds to 20 ms, ms50 corresponds to 50 ms and so on.

UECapabilityEnquiry

The UECapabilityEnquiry message is used to request UE radio access capabilities for NR as well as for other RATs.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

UECapabilityEnquiry message

```
-- ASN1START
-- TAG-UECAPABILITYENOUIRY-START
UECapabilityEnquiry ::=
   rrc-TransactionIdentifier
                                      RRC-TransactionIdentifier,
   criticalExtensions
                                      CHOICE {
       ueCapabilityEnquiry
                                          UECapabilityEnquiry-IEs,
       criticalExtensionsFuture
                                          SEOUENCE {}
UECapabilityEnquiry-IEs ::=
                                  SEOUENCE {
   ue-CapabilityRAT-RequestList
                                      UE-CapabilityRAT-RequestList,
   lateNonCriticalExtension
                                      OCTET STRING
                                      OCTET STRING (CONTAINING UECapabilityEnquiry-v1560-IEs)
UECapabilityEnquiry-v1560-IEs ::= SEQUENCE {
                                      UE-CapabilityRequestFilterCommon
   capabilityRequestFilterCommon
   nonCriticalExtension
                                      UECapabilityEnquiry-v1610-IEs
UECapabilityEnquiry-v1610-IES ::= SEQUENCE {
                                                                    OPTIONAL, -- Need N
   rrc-SegAllowed-r16
                                      ENUMERATED {enabled}
   nonCriticalExtension
                                      SEQUENCE {}
                                                                    OPTIONAL
-- TAG-UECAPABILITYENQUIRY-STOP
-- ASN1STOP
```

OPTIONAL, OPTIONAL -- Need N

OPTIONAL, -- Need N
OPTIONAL

UECapabilityInformation

The IE *UECapabilityInformation* message is used to transfer UE radio access capabilities requested by the network.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

UECapabilityInformation message

```
-- ASN1START
-- TAG-UECAPABILITYINFORMATION-START
UECapabilityInformation ::= SEQUENCE {
```

```
rrc-TransactionIdentifier
                                        RRC-TransactionIdentifier,
    criticalExtensions
                                        CHOICE {
        ueCapabilityInformation
                                            UECapabilityInformation-IEs,
        criticalExtensionsFuture
                                            SEQUENCE {}
UECapabilityInformation-IEs ::=
                                     SEOUENCE {
    ue-CapabilityRAT-ContainerList
                                        UE-CapabilityRAT-ContainerList
    lateNonCriticalExtension
                                        OCTET STRING
    nonCriticalExtension
                                        SEQUENCE { }
-- TAG-UECAPABILITYINFORMATION-STOP
-- ASN1STOP
```

OPTIONAL, OPTIONAL, OPTIONAL

UEInformationRequest

The *UEInformationRequest* message is used by the network to retrieve information from the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

UEInformationRequest message

```
-- ASN1START
-- TAG-UEINFORMATIONREQUEST-START
UEInformationRequest-r16 ::=
                                 SEOUENCE {
    rrc-TransactionIdentifier
                                     RRC-TransactionIdentifier,
    criticalExtensions
                                     CHOICE {
        ueInformationRequest-r16
                                         UEInformationRequest-r16-IEs,
        criticalExtensionsFuture
                                         SEQUENCE {}
UEInformationRequest-r16-IEs ::= SEQUENCE {
    idleModeMeasurementReq-r16
                                     ENUMERATED{true}
                                                                               OPTIONAL, -- Need N
    logMeasReportReq-r16
                                     ENUMERATED {true}
                                                                               OPTIONAL, -- Need N
                                                                               OPTIONAL, -- Need N
    connEstFailReportReq-r16
                                     ENUMERATED {true}
    ra-ReportReq-r16
                                     ENUMERATED {true}
                                                                               OPTIONAL, -- Need N
                                                                               OPTIONAL, -- Need N
    rlf-ReportReq-r16
                                     ENUMERATED {true}
                                                                                 OPTIONAL, -- Need N
    mobilityHistoryReportReq-r16
                                       ENUMERATED {true}
                                     OCTET STRING
    lateNonCriticalExtension
                                                                               OPTIONAL,
    nonCriticalExtension
                                     UEInformationRequest-v1700-IEs
                                                                               OPTIONAL
```

UEInformationRequest-IEs field descriptions

coarseLocationRequest

This field is used to request UE to report coarse location information.

connEstFailReportReq

This field is used to indicate whether the UE shall report information about the connection failure.

idleModeMeasurementReg

This field indicates that the UE shall report the idle/inactive measurement information, if available, to the network in the UEInformationResponse message.

logMeasReportReg

This field is used to indicate whether the UE shall report information about logged measurements.

mobilityHistoryReportReg

This field is used to indicate whether the UE shall report information about mobility history information.

ra-ReportReq

This field is used to indicate whether the UE shall report information about the random access procedure.

rlf-ReportRea

This field is used to indicate whether the UE shall report information about the radio link failure.

successHO-ReportReq

This field is used to indicate whether the UE shall report information about the successful handover report.

UEInformationResponse

The *UEInformationResponse* message is used by the UE to transfer information requested by the network.

Signalling radio bearer: SRB1 or SRB2 (when logged measurement information is included)

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to network

UEInformationResponse message

⁻⁻ ASN1START

⁻⁻ TAG-UEINFORMATIONRESPONSE-START

```
UEInformationResponse-r16 ::=
                                     SEOUENCE {
    rrc-TransactionIdentifier
                                          RRC-TransactionIdentifier.
    criticalExtensions
                                          CHOICE {
        ueInformationResponse-r16
                                              UEInformationResponse-r16-IEs,
                                              SEOUENCE {}
        criticalExtensionsFuture
UEInformationResponse-r16-IEs ::=
                                     SEOUENCE {
    measResultIdleEUTRA-r16
                                          MeasResultIdleEUTRA-r16
                                                                               OPTIONAL,
    measResultIdleNR-r16
                                          MeasResultIdleNR-r16
                                                                               OPTIONAL,
    logMeasReport-r16
                                          LogMeasReport-r16
                                                                               OPTIONAL,
    connEstFailReport-r16
                                          ConnEstFailReport-r16
                                                                               OPTIONAL,
    ra-ReportList-r16
                                          RA-ReportList-r16
                                                                               OPTIONAL,
    rlf-Report-r16
                                          RLF-Report-r16
                                                                               OPTIONAL,
    mobilityHistoryReport-r16
                                          MobilityHistoryReport-r16
                                                                               OPTIONAL,
    lateNonCriticalExtension
                                          OCTET STRING
                                                                               OPTIONAL,
    nonCriticalExtension
                                          UEInformationResponse-v1700-IEs
                                                                               OPTIONAL
UEInformationResponse-v1700-IEs ::=
                                        SEOUENCE {
    successHO-Report-r17
                                          SuccessHO-Report-r17
                                                                               OPTIONAL,
    connEstFailReportList-r17
                                          ConnEstFailReportList-r17
                                                                               OPTIONAL,
    coarseLocationInfo-r17
                                          OCTET STRING
                                                                               OPTIONAL,
    nonCriticalExtension
                                          SEOUENCE {}
                                                                               OPTIONAL
                                     SEQUENCE {
LogMeasReport-r16 ::=
    absoluteTimeStamp-r16
                                          AbsoluteTimeInfo-r16,
    traceReference-r16
                                          TraceReference-r16,
    traceRecordingSessionRef-r16
                                          OCTET STRING (SIZE (2)),
    tce-Id-r16
                                          OCTET STRING (SIZE (1)),
    logMeasInfoList-r16
                                          LogMeasInfoList-r16,
    logMeasAvailable-r16
                                          ENUMERATED {true}
                                                                               OPTIONAL,
                                          ENUMERATED {true}
    logMeasAvailableBT-r16
                                                                               OPTIONAL,
                                          ENUMERATED {true}
    logMeasAvailableWLAN-r16
                                                                               OPTIONAL,
LogMeasInfoList-r16 ::=
                                      SEQUENCE (SIZE (1..maxLogMeasReport-r16)) OF LogMeasInfo-r16
LogMeasInfo-r16 ::=
                                     SEOUENCE {
    locationInfo-r16
                                          LocationInfo-r16
                                                                               OPTIONAL,
    relativeTimeStamp-r16
                                          INTEGER (0..7200),
    servCellIdentity-r16
                                          CGI-Info-Logging-r16
                                                                               OPTIONAL,
    measResultServingCell-r16
                                          MeasResultServingCell-r16
                                                                               OPTIONAL,
    measResultNeighCells-r16
                                          SEOUENCE {
        measResultNeighCellListNR
                                              MeasResultListLogging2NR-r16
                                                                               OPTIONAL,
        measResultNeighCellListEUTRA
                                              MeasResultList2EUTRA-r16
                                                                               OPTIONAL
    anyCellSelectionDetected-r16
                                          ENUMERATED {true}
                                                                               OPTIONAL,
    . . . ,
    [ [
    inDeviceCoexDetected-r17
                                          ENUMERATED {true}
                                                                               OPTIONAL
```

```
]]
ConnEstFailReport-r16 ::=
                                     SEOUENCE {
   measResultFailedCell-r16
                                         MeasResultFailedCell-r16.
   locationInfo-r16
                                         LocationInfo-r16
                                                                              OPTIONAL,
    measResultNeighCells-r16
                                         SEOUENCE {
        measResultNeighCellListNR
                                             MeasResultList2NR-r16
                                                                                  OPTIONAL.
       measResultNeighCellListEUTRA
                                              MeasResultList2EUTRA-r16
                                                                                  OPTIONAL
    numberOfConnFail-r16
                                         INTEGER (1..8),
                                                 PerRAInfoList-r16,
    perRAInfoList-r16
    timeSinceFailure-r16
                                         TimeSinceFailure-r16,
ConnEstFailReportList-r17 ::= SEOUENCE (SIZE (1..maxCEFReport-r17)) OF ConnEstFailReport-r16
MeasResultServingCell-r16 ::=
                                     SEOUENCE {
   resultsSSB-Cell
                                         MeasQuantityResults,
    resultsSSB
                                         SEQUENCE {
       best-ssb-Index
                                             SSB-Index,
        best-ssb-Results
                                             MeasQuantityResults,
                                             INTEGER (1..maxNrofSSBs-r16)
       numberOfGoodSSB
                                                                              OPTIONAL
MeasResultFailedCell-r16 ::=
                                     SEOUENCE {
    cqi-Info
                                         CGI-Info-Logging-r16,
    measResult-r16
                                         SEQUENCE {
        cellResults-r16
                                              SEQUENCE {
           resultsSSB-Cell-r16
                                                 MeasQuantityResults
       rsIndexResults-r16
                                              SEQUENCE {
            resultsSSB-Indexes-r16
                                                  ResultsPerSSB-IndexList
RA-ReportList-r16 ::= SEQUENCE (SIZE (1..maxRAReport-r16)) OF RA-Report-r16
RA-Report-r16 ::=
                                     SEOUENCE {
    cellId-r16
        cellGlobalId-r16
                                              CGI-Info-Logging-r16,
        pci-arfcn-r16
                                             PCI-ARFCN-NR-r16
    ra-InformationCommon-r16
                                         RA-InformationCommon-r16
    raPurpose-r16
                                         ENUMERATED {accessRelated, beamFailureRecovery, reconfigurationWithSync, ulUnSynchronized,
                                                     schedulingRequestFailure, noPUCCHResourceAvailable, requestForOtherSI,
                                                     msq3RequestForOtherSI-r17, spare8, spare7, spare6, spare5, spare4, spare3,
                                                     spare2, spare1},
    . . . ,
    [ [
    spCellID-r17
                                         CGI-Info-Logging-r16
                                                                                           OPTIONAL
```

```
]]
RA-InformationCommon-r16 ::=
                                     SEOUENCE {
    absoluteFrequencyPointA-r16
                                         ARFCN-ValueNR.
    locationAndBandwidth-r16
                                         INTEGER (0..37949),
    subcarrierSpacing-r16
                                         SubcarrierSpacing,
    msq1-FrequencyStart-r16
                                         INTEGER (0..maxNrofPhysicalResourceBlocks-1)
                                                                                           OPTIONAL.
    msg1-FrequencyStartCFRA-r16
                                         INTEGER (0..maxNrofPhysicalResourceBlocks-1)
                                                                                           OPTIONAL,
    msgl-SubcarrierSpacing-r16
                                         SubcarrierSpacing
                                                                                           OPTIONAL,
    msgl-SubcarrierSpacingCFRA-r16
                                         SubcarrierSpacing
                                                                                           OPTIONAL,
                                         ENUMERATED {one, two, four, eight}
    msq1-FDM-r16
                                                                                           OPTIONAL,
    msg1-FDMCFRA-r16
                                         ENUMERATED {one, two, four, eight}
                                                                                           OPTIONAL,
    perRAInfoList-r16
                                         PerRAInfoList-r16.
    Π
    perRAInfoList-v1660
                                      PerRAInfoList-v1660
                                                                                     OPTIONAL
    ]],
    msq1-SCS-from-prach-ConfigurationIndex-r16 ENUMERATED {kHz1dot25, kHz5, spare2, spare1} OPTIONAL
    11,
    [ [
    msql-SCS-From-prach-ConfigurationIndexCFRA-r16 ENUMERATED {kHz1dot25, kHz5, spare2, spare1} OPTIONAL
    11,
    ] ]
    msqA-RO-FrequencyStart-r17
                                         INTEGER (0..maxNrofPhysicalResourceBlocks-1)
                                                                                           OPTIONAL,
                                         INTEGER (0..maxNrofPhysicalResourceBlocks-1)
    msqA-RO-FrequencyStartCFRA-r17
                                                                                           OPTIONAL,
    msqA-SubcarrierSpacing-r17
                                         SubcarrierSpacing
                                                                                           OPTIONAL,
                                         ENUMERATED {one, two, four, eight}
    msqA-RO-FDM-r17
                                                                                           OPTIONAL,
                                         ENUMERATED {one, two, four, eight}
    msqA-RO-FDMCFRA-r17
                                                                                           OPTIONAL,
    msqA-SCS-from-prach-ConfigurationIndex-r17 ENUMERATED {kHz1dot25, kHz5, spare2, spare1} OPTIONAL,
                                         ENUMERATED {n1, n2, n4, n6, n8, n10, n20, n50, n100, n200} OPTIONAL,
    msgA-TransMax-r17
    msqA-MCS-r17
                                         INTEGER (0..15)
                                                                                            OPTIONAL,
    nrofPRBs-PerMsgA-PO-r17
                                         INTEGER (1..32)
                                                                                           OPTIONAL,
    msgA-PUSCH-TimeDomainAllocation-r17 INTEGER (1..maxNrofUL-Allocations)
                                                                                           OPTIONAL,
    frequencyStartMsgA-PUSCH-r17
                                         INTEGER (0..maxNrofPhysicalResourceBlocks-1)
                                                                                           OPTIONAL,
    nrofMsqA-PO-FDM-r17
                                         ENUMERATED {one, two, four, eight}
                                                                                           OPTIONAL,
    dlPathlossRSRP-r17
                                         RSRP-Range
                                                                                           OPTIONAL,
    intendedSIBs-r17
                                         SEQUENCE (SIZE (1..maxSIB)) OF SIB-Type-r17
                                                                                           OPTIONAL,
    ssbsForSI-Acquisition-r17
                                         SEQUENCE (SIZE (1..maxNrofSSBs-r16)) OF SSB-Index
                                                                                               OPTIONAL,
                                         BIT STRING (SIZE (5))
    msqA-PUSCH-PayloadSize-r17
                                                                                           OPTIONAL,
    onDemandSISuccess-r17
                                         ENUMERATED {true}
                                                                                           OPTIONAL
    11
PerRAInfoList-r16 ::= SEOUENCE (SIZE (1..200)) OF PerRAInfo-r16
PerRAInfoList-v1660 ::= SEQUENCE (SIZE (1..200)) OF PerRACSI-RSInfo-v1660
PerRAInfo-r16 ::=
                                     CHOICE {
                                         PerRASSBInfo-r16,
    perRASSBInfoList-r16
    perRACSI-RSInfoList-r16
                                         PerRACSI-RSInfo-r16
```

```
PerRASSBInfo-r16 ::=
                                     SEOUENCE {
    ssb-Index-r16
                                         SSB-Index,
                                         INTEGER (1..200),
    numberOfPreamblesSentOnSSB-r16
    perRAAttemptInfoList-r16
                                         PerRAAttemptInfoList-r16
PerRACSI-RSInfo-r16 ::=
                                     SEOUENCE {
    csi-RS-Index-r16
                                         CSI-RS-Index,
    numberOfPreamblesSentOnCSI-RS-r16
                                         INTEGER (1..200)
PerRACSI-RSInfo-v1660 ::=
                                  SEOUENCE {
    csi-RS-Index-v1660
                                         INTEGER (1..96)
                                                                              OPTIONAL
PerRAAttemptInfoList-r16 ::=
                                     SEQUENCE (SIZE (1..200)) OF PerRAAttemptInfo-r16
PerRAAttemptInfo-r16 ::=
                                     SEOUENCE {
    contentionDetected-r16
                                         BOOLEAN
                                                                 OPTIONAL,
    dlRSRPAboveThreshold-r16
                                         BOOLEAN
                                                                 OPTIONAL,
    11
    fallbackToFourStepRA-r17
                                         ENUMERATED {true}
                                                                 OPTIONAL
    11
SIB-Type-r17 ::= ENUMERATED {sibType2, sibType3, sibType4, sibType5, sibType9, sibType10-v1610, sibType11-v1610, sibType12-v1610,
                             sibType13-v1610, sibType14-v1610, spare6, spare5, spare4, spare3, spare2, spare1}
RLF-Report-r16 ::=
                                     CHOICE {
    nr-RLF-Report-r16
                                         SEQUENCE {
       measResultLastServCell-r16
                                             MeasResultRLFNR-r16,
        measResultNeighCells-r16
                                              SEOUENCE {
            measResultListNR-r16
                                                 MeasResultList2NR-r16
                                                                              OPTIONAL,
            measResultListEUTRA-r16
                                                 MeasResultList2EUTRA-r16
                                                                              OPTIONAL
                                                          OPTIONAL,
       c-RNTI-r16
                                             RNTI-Value,
        previousPCellId-r16
                                              CHOICE {
           nrPreviousCell-r16
                                                 CGI-Info-Logging-r16,
            eutraPreviousCell-r16
                                                  CGI-InfoEUTRALogging
                                                                              OPTIONAL,
        failedPCellId-r16
                                              CHOICE {
            nrFailedPCellId-r16
                                                  CHOICE {
                cellGlobalId-r16
                                                      CGI-Info-Logging-r16,
                pci-arfcn-r16
                                                     PCI-ARFCN-NR-r16
            eutraFailedPCellId-r16
                                              CHOICE {
                cellGlobalId-r16
                                                  CGI-InfoEUTRALogging,
                pci-arfcn-r16
                                                  PCI-ARFCN-EUTRA-r16
        reconnectCellId-r16
                                              CHOICE {
            nrReconnectCellId-r16
                                                  CGI-Info-Logging-r16,
            eutraReconnectCellId-r16
                                                 CGI-InfoEUTRALogging
```

```
OPTIONAL,
        timeUntilReconnection-r16
                                              TimeUntilReconnection-r16
                                                                                                    OPTIONAL,
                                              CGI-Info-Logging-r16
        reestablishmentCellId-r16
                                                                                                    OPTIONAL.
        timeConnFailure-r16
                                              INTEGER (0..1023)
                                                                                                    OPTIONAL,
        timeSinceFailure-r16
                                              TimeSinceFailure-r16.
        connectionFailureType-r16
                                              ENUMERATED {rlf, hof},
        rlf-Cause-r16
                                              ENUMERATED {t310-Expiry, randomAccessProblem, rlc-MaxNumRetx,
                                                          beamFailureRecoveryFailure, lbtFailure-r16,
                                                          bh-rlfRecoveryFailure, t312-expiry-r17, spare1},
        locationInfo-r16
                                              LocationInfo-r16
                                                                                                    OPTIONAL,
        noSuitableCellFound-r16
                                              ENUMERATED {true}
                                                                                                    OPTIONAL,
        ra-InformationCommon-r16
                                              RA-InformationCommon-r16
                                                                                                    OPTIONAL,
        Π
        csi-rsRLMConfiqBitmap-v1650
                                              BIT STRING (SIZE (96))
                                                                                                    OPTIONAL
        ]],
        ] ]
        lastHO-Type-r17
                                              ENUMERATED {cho, daps, spare2, spare1}
                                                                                                    OPTIONAL,
                                              TimeConnSourceDAPS-Failure-r17
        timeConnSourceDAPS-Failure-r17
                                                                                                    OPTIONAL,
                                              TimeSinceCHO-Reconfig-r17
        timeSinceCHO-Reconfig-r17
                                                                                                    OPTIONAL,
        choCellId-r17
                                              CHOICE {
            cellGlobalId-r17
                                                  CGI-Info-Logging-r16,
            pci-arfcn-r17
                                                  PCI-ARFCN-NR-r16
                                                                                                    OPTIONAL.
        choCandidateCellList-r17
                                              ChoCandidateCellList-r17
                                                                                                    OPTIONAL
        ]]
    eutra-RLF-Report-r16
                                          SEOUENCE {
        failedPCellId-EUTRA
                                              CGI-InfoEUTRALogging,
        measResult-RLF-Report-EUTRA-r16
                                              OCTET STRING,
        . . . ,
        ] ]
        measResult-RLF-Report-EUTRA-v1690
                                              OCTET STRING
                                                                                                    OPTIONAL
        ]]
SuccessHO-Report-r17 ::=
                                          SEOUENCE {
    sourceCellInfo-r17
                                              SEOUENCE {
        sourcePCellId-r17
                                                  CGI-Info-Logging-r16,
        sourceCellMeas-r17
                                                  MeasResultSuccessHONR-r17
                                                                                                    OPTIONAL,
                                                  ENUMERATED {true}
        rlf-InSourceDAPS-r17
                                                                                                    OPTIONAL
    targetCellInfo-r17
                                              SEOUENCE {
        targetPCellId-r17
                                                  CGI-Info-Logging-r16,
                                                  MeasResultSuccessHONR-r17
        targetCellMeas-r17
                                                                                                    OPTIONAL
    measResultNeighCells-r17
                                              SEOUENCE {
        measResultListNR-r17
                                                  MeasResultList2NR-r16
                                                                                                    OPTIONAL,
        measResultListEUTRA-r17
                                                  MeasResultList2EUTRA-r16
                                                                                                    OPTIONAL
                                                                                                    OPTIONAL,
    locationInfo-r17
                                              LocationInfo-r16
                                                                                                    OPTIONAL,
    timeSinceCHO-Reconfig-r17
                                              TimeSinceCHO-Reconfig-r17
                                                                                                    OPTIONAL,
                                              SHR-Cause-r17
    shr-Cause-r17
                                                                                                    OPTIONAL,
```

```
ra-InformationCommon-r17
                                              RA-InformationCommon-r16
                                                                                                   OPTIONAL,
    upInterruptionTimeAtHO-r17
                                              UPInterruptionTimeAtHO-r17
                                                                                                   OPTIONAL,
    c-RNTI-r17
                                              RNTI-Value
                                                                                                   OPTIONAL,
MeasResultList2NR-r16 ::=
                                     SEQUENCE(SIZE (1..maxFreg)) OF MeasResult2NR-r16
MeasResultList2EUTRA-r16 ::=
                                     SEQUENCE(SIZE (1..maxFreq)) OF MeasResult2EUTRA-r16
MeasResult2NR-r16 ::=
                                     SEQUENCE {
    ssbFrequency-r16
                                         ARFCN-ValueNR
                                                                                                   OPTIONAL,
    refFreqCSI-RS-r16
                                         ARFCN-ValueNR
                                                                                                   OPTIONAL,
    measResultList-r16
                                         MeasResultListNR
MeasResultListLogging2NR-r16 ::=
                                     SEQUENCE(SIZE (1..maxFreq)) OF MeasResultLogging2NR-r16
MeasResultLogging2NR-r16 ::=
                                     SEOUENCE {
    carrierFreg-r16
                                         ARFCN-ValueNR,
    measResultListLoggingNR-r16
                                         MeasResultListLoggingNR-r16
MeasResultListLoggingNR-r16 ::=
                                     SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultLoggingNR-r16
MeasResultLoggingNR-r16 ::=
                                     SEOUENCE {
    physCellId-r16
                                         PhysCellId,
    resultsSSB-Cell-r16
                                         MeasOuantityResults,
    numberOfGoodSSB-r16
                                         INTEGER (1..maxNrofSSBs-r16) OPTIONAL
MeasResult2EUTRA-r16 ::=
                                     SEQUENCE {
    carrierFreq-r16
                                         ARFCN-ValueEUTRA,
    measResultList-r16
                                         MeasResultListEUTRA
MeasResultRLFNR-r16 ::=
                                     SEQUENCE {
    measResult-r16
                                         SEQUENCE
        cellResults-r16
                                              SEOUENCE {
           resultsSSB-Cell-r16
                                                  MeasQuantityResults
                                                                                                   OPTIONAL,
            resultsCSI-RS-Cell-r16
                                                  MeasQuantityResults
                                                                                                   OPTIONAL
       rsIndexResults-r16
                                              SEOUENCE {
            resultsSSB-Indexes-r16
                                                  ResultsPerSSB-IndexList
                                                                                                   OPTIONAL,
            ssbRLMConfigBitmap-r16
                                                  BIT STRING (SIZE (64))
                                                                                                   OPTIONAL,
           resultsCSI-RS-Indexes-r16
                                                  ResultsPerCSI-RS-IndexList
                                                                                                   OPTIONAL.
            csi-rsRLMConfigBitmap-r16
                                                 BIT STRING (SIZE (96))
                                                                                                   OPTIONAL
                                                                                               OPTIONAL
MeasResultSuccessHONR-r17::=
                                     SEOUENCE {
    measResult-r17
                                         SEQUENCE
       cellResults-r17
                                              SEQUENCE {
                                                  MeasQuantityResults
            resultsSSB-Cell-r17
                                                                                                   OPTIONAL,
```

```
resultsCSI-RS-Cell-r17
                                                 MeasOuantityResults
                                                                                                  OPTIONAL
        rsIndexResults-r17
                                             SEOUENCE {
            resultsSSB-Indexes-r17
                                                 ResultsPerSSB-IndexList
                                                                                                  OPTIONAL,
            resultsCSI-RS-Indexes-r17
                                                 ResultsPerCSI-RS-IndexList
                                                                                                  OPTIONAL
ChoCandidateCellList-r17 ::=
                                     SEQUENCE(SIZE (1..maxNrofCondCells-r16)) OF ChoCandidateCell-r17
ChoCandidateCell-r17 ::=
                                     CHOICE {
    cellGlobalId-r17
                                         CGI-Info-Logging-r16,
    pci-arfcn-r17
                                         PCI-ARFCN-NR-r16
SHR-Cause-r17 ::=
                                     SEQUENCE {
    t304-cause-r17
                                         ENUMERATED {true}
                                                                                                  OPTIONAL,
    t310-cause-r17
                                         ENUMERATED {true}
                                                                                                  OPTIONAL,
    t312-cause-r17
                                         ENUMERATED {true}
                                                                                                  OPTIONAL,
    sourceDAPS-Failure-r17
                                         ENUMERATED {true}
                                                                                                  OPTIONAL,
TimeSinceFailure-r16 ::= INTEGER (0..172800)
MobilityHistoryReport-r16 ::= VisitedCellInfoList-r16
TimeUntilReconnection-r16 ::= INTEGER (0..172800)
TimeSinceCHO-Reconfig-r17 ::= INTEGER (0..1023)
TimeConnSourceDAPS-Failure-r17 ::= INTEGER (0..1023)
UPInterruptionTimeAtHO-r17 ::= INTEGER (0..1023)
-- TAG-UEINFORMATIONRESPONSE-STOP
-- ASN1STOP
```

UEInformationResponse-IEs field descriptions

coarseLocationInfo

Parameter type Ellipsoid-Point defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit. The least significant bits of *degreesLatitude* and *degreesLongitude* are set to 0 to meet the accuracy requirement corresponds to a granularity of approximately 2 km.

It is up to UE implementation how many LSBs are set to 0 to meet the accuracy requirement.

connEstFailReport

This field is used to provide connection establishment failure or connection resume failure information.

connEstFailReportList

This field is used to provide the list of connEstFailReport that are stored by the UE for the past up to maxCEFReport-r17.

logMeasReport

This field is used to provide the measurement results stored by the UE associated to logged MDT.

measResultIdleEUTRA

EUTRA measurement results performed during RRC_INACTIVE or RRC_IDLE.

measResultIdleNR

NR measurement results performed during RRC_INACTIVE or RRC_IDLE.

ra-ReportList

This field is used to provide the list of RA reports that is stored by the UE for the past upto *maxRAReport-r16* number of successful random access procedures, or failed or successful completion of on-demand system information request procedure.

rlf-Report

This field is used to indicate the RLF report related contents.

successHO-Report

This field is used to provide the successful handover report if triggered based on the successful handover configuration.

LogMeasReport field descriptions

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absoluteTimeStamp

Indicates the absolute time when the logged measurement configuration logging is provided, as indicated by NR within absoluteTimeInfo.

anyCellSelectionDetected

This field is used to indicate the detection of any cell selection state, as defined in TS 38.304 [20]. The UE sets this field when performing the logging of measurement results in RRC_IDLE or RRC_INACTIVE and there is no suitable cell or no acceptable cell.

inDeviceCoexDetected

Indicates that measurement logging is suspended due to IDC problem detection.

measResultServingCell

This field refers to the log measurement results taken in the Serving cell.

numberOfGoodSSB

Indicates the number of good beams (beams that are above absThreshSS-BlocksConsolidation, if configured by the network) associated to the cells within the R value range (which is configured by network for cell reselection) of the highest ranked cell as part of the beam level measurements. If the UE has no SSB of a neighbour cell whose measurement quantity is above the absThreshSS-BlocksConsolidation or if the network has not configured the absThreshSS-BlocksConsolidation, then the UE does not include numberOfGoodSSB for the corresponding neighbour cell. If the UE has no SSB of the serving cell whose measurement quantity is above the absThreshSS-BlocksConsolidation or if the network has not configured the absThreshSS-BlocksConsolidation, then the UE shall set the numberOfGoodSSB for the serving cell to one.

relativeTimeStamp

Indicates the time of logging measurement results, measured relative to the absoluteTimeStamp. Value in seconds.

tce-ld

Parameter Trace Collection Entity Id: See TS 32.422 [52].

traceRecordingSessionRef

Parameter Trace Recording Session Reference: See TS 32.422 [52].

ConnEstFailReport field descriptions

measResultFailedCell

This field refers to the last measurement results taken in the cell, where connection establishment failure or connection resume failure happened.

measResultNeighCells

This field refers to the neighbour cell measurements when connection establishment failure or connection resume failure happened.

numberOfConnFail

This field is used to indicate the latest number of consecutive failed RRCSetup or RRCResume procedures in the same cell independent of RRC state transition.

timeSinceFailure

This field is used to indicate the time that elapsed since the connection (establishment or resume) failure. Value in seconds. The maximum value 172800 means 172800s or longer.

RA-InformationCommon field descriptions

absoluteFrequencyPointA

This field indicates the absolute frequency position of the reference resource block (Common RB 0).

IocationAndBandwidth

Frequency domain location and bandwidth of the bandwidth part associated to the random-access resources used by the UE.

perRAInfoList, perRAInfoList-v1660

This field provides detailed information about each of the random access attempts in the chronological order of the random access attempts. If *perRAInfoList-v1660* is present, it shall contain the same number of entries, listed in the same order as in *perRAInfoList-r16*.

subcarrierSpacing

Subcarrier spacing used in the BWP associated to the random-access resources used by the UE.

RA-Report field descriptions

cellID

This field indicates the CGI of the cell in which the associated random access procedure was performed.

contentionDetected

This field is used to indicate that contention was detected for the transmitted preamble in the given random access attempt or not. This field is not included when the UE performs random access attempt is using contention free random-access resources or when the *raPurpose* is set to *requestForOtherSI* or when the RA attempt is a 2-step RA attempt and fallback to 4-step RA did not occur (i.e. *fallbackToFourStepRA* is not included).

csi-RS-Index, csi-RS-Index-v1660

This field is used to indicate the CSI-RS index corresponding to the random access attempt.

If the random access procedure is for beam failure recovery, the field indicates the NZP-CSI-RS-Resourceld. For CSI-RS index larger than maxNrofCSI-RS-ResourcesRRM-1, the index value is the sum of csi-RS-Index (without suffix) and csi-RS-Index-v1660.

dIPathlossRSRP

Measured RSRP of the DL pathloss reference obtained at the time of RA_Type selection stage of the RA procedure as captured in TS 38.321 [3].

dIRSRPAboveThreshold

In 4 step random access procedure, this field is used to indicate whether the DL beam (SSB) quality associated to the random access attempt was above or below the threshold *rsrp-ThresholdSSB* in *beamFailureRecoveryConfig* in UL BWP configuration of UL BWP selected for random access procedure initiated for beam failure recovery; Otherwise, *rsrp-ThresholdSSB* in *rach-ConfigCommon* in UL BWP configuration of UL BWP selected for random access procedure.

In 2 step random access procedure, this field is used to indicate whether the DL beam (SSB) quality associated to the random access attempt was above or below the threshold msgA-RSRP-ThresholdSSB in rach-ConfigCommonTwoStepRA in UL BWP configuration of UL BWP selected for random access procedure.

fallbackToFourStepRA

This field indicates if a fallback indication in MsgB is received (according to TS 38.321 [3]) for the 2-step random access attempt.

intendedSIBs

This field indicates the SIB(s) the UE wanted to receive as a result of the on demand SI request (when the RA procedure is a used as a SI request) initiated by the UE. That is, it indicates the one(s) of the SIB(s) in the SI message(s) requested to be broadcast that the UE was interested in.

msg1-SCS-From-prach-ConfigurationIndex

This field is set by the UE with the corresponding SCS for CBRA as derived from the *prach-ConfigurationIndex* in *RACH-ConfigGeneric* when the *msg1-SubcarrierSpacing* is absent; otherwise, this field is absent.

msg1-SCS-From-prach-ConfigurationIndexCFRA

This field is set by the UE with the corresponding SCS for CFRA as derived from the *prach-ConfigurationIndex* in *RACH-ConfigGeneric* when the *msg1-SubcarrierSpacing* is absent; otherwise, this field is absent.

msqA-PUSCH-PayloadSize

This field indicates the size of the overall payload available in the UE buffer at the time of initiating the 2 step RA procedure. The value refers to the index of TS 38.321 [3], table 6.1.3.1-1, corresponding to the UE buffer size.

msqA-RO-FDM

This field indicates the number of msgA PRACH transmission occasions Frequency-Division Multiplexed in one time instance for the PRACH resources configured for 2-step CBRA..

msgA-RO-FDMCFRA

This field indicates the number of msgA PRACH transmission occasions Frequency-Division Multiplexed in one time instance for the PRACH resources configured for 2-step CFRA.

msgA-RO-FrequencyStart

This field indicates the lowest resource block of the contention based random-access resources for 2-step CBRA in the random-access procedure. The indication has the form of the offset of the lowest PRACH transmissions occasion with respect to PRB 0 in the frequency domain.

msgA-RO-FrequencyStartCFRA

This field indicates the lowest resource block of the contention free random-access resources for the 2-step CFRA in the random-access procedure. The indication has the form of the offset of the lowest PRACH transmissions occasion with respect to PRB 0 in the frequency domain.

msgA-SCS-From-prach-ConfigurationIndex

This field is set by the UE with the corresponding SCS as derived from the *msgA-PRACH-ConfigurationIndex* in *RACH-ConfigGenericTwoStepRA* (see tables Table 6.3.3.1-1, Table 6.3.3.1-2, Table 6.3.3.2-2 and Table 6.3.3.2-3, TS 38.211 [16]) when the *msgA-SubcarrierSpacing* is absent and when only 2-step random-access resources are available in the UL BWP used in the random-access procedure; otherwise, this field is absent.

numberOfPreamblesSentOnCSI-RS

This field is used to indicate the total number of successive RA preambles that were transmitted on the corresponding CSI-RS.

numberOfPreamblesSentOnSSB

This field is used to indicate the total number of successive RA preambles that were transmitted on the corresponding SS/PBCH block.

onDemandSISuccess

This field is set to *true* when the RA report entry is included because of either msg1 based on demand SI request or msg3 based on demand SI request and if the on-demand SI request is successful. Otherwise, the field is absent.

perRAAttemptInfoList

This field provides detailed information about a random access attempt.

perRACSI-RSInfoList

This field provides detailed information about the successive random access attempts associated to the same CSI-RS.

perRASSBInfoList

This field provides detailed information about the successive random access attempts associated to the same SS/PBCH block.

ra-InformationCommon

This field is used to provide information on random access attempts. This field is mandatory present.

raPurpose

This field is used to indicate the RA scenario for which the RA report entry is triggered. The RA accesses associated to Initial access from RRC_IDLE, RRC re-establishment procedure, transition from RRC-INACTIVE. The indicator *beamFailureRecovery* is used in case of successful beam failure recovery related RA procedure in the SpCell [3]. The indicator *reconfigurationWithSync* is used if the UE executes a reconfiguration with sync. The indicator *ulUnSynchronized* is used if the random access procedure is initiated in a SpCell by DL or UL data arrival during RRC_CONNECTED when the timeAlignmentTimer is not running in the PTAG or if the RA procedure is initiated in a serving cell by a PDCCH order [3]. The indicator *schedulingRequestFailure* is used in case of SR failures [3]. The indicator *noPUCCHResourceAvailable* is used when the UE has no valid SR PUCCH resources configured [3]. The indicator *requestForOtherSI* is used for MSG1 based on demand SI request. The indicator *msg3RequestForOtherSI* is used in case of MSG3 based SI request. The field can also be used for the SCG-related RA-Report when the *raPurpose* is set to *beamFailureRecovery*, *reconfigurationWithSync*, *ulUnSynchronized*, *schedulingRequestFailure* and *noPUCCHResourceAvailable*.

spCeIIID

This field is used to indicate the CGI of the SpCell of the cell group associated to the SCell in which the associated random access procedure was performed. If the UE performs RA procedure on a SCell associated to the MCG, then this field is set to the CGI of the PCell and if the UE performs RA procedure on a SCell associated to the SCG, then this field is set to the CGI of the PSCell. If the CGI of the PSCell is not available at the UE for the RA procedure performed on a SCell associated to the SCG or for the RA procedure on the PSCell, this field is set to the CGI of the PCell. Otherwise, the field is absent.

ssb-Index

This field is used to indicate the SS/PBCH index of the SS/PBCH block corresponding to the random access attempt.

ssbsForSI-Acquisition

This field indicates the SSB(s) (in the form of SSB index(es)) that the UE used to receive the requested SI message(s). The field is present if the purpose of the random access procedure was to request on-demand SI (i.e. if the *raPurpose* is set to *requestForOtherSI* or *msq3RequestForOtherSI*). Otherwise, the field is absent.

RLF-Report field descriptions

choCandidateCellList

This field is used to indicate the list of candidate target cells for conditional handover included in *condRRCReconfig* at the time of connection failure. The field does not include the candidate target cells included in *measResulNeighCells*.

choCellId

This field is used to indicate the candidate target cell for conditional handover included in *condRRCReconfig* that the UE selected for CHO based recovery while T311 is running.

connectionFailureType

This field is used to indicate whether the connection failure is due to radio link failure or handover failure.

csi-rsRLMConfigBitmap, csi-rsRLMConfigBitmap-v1650

These fields are used to indicate the CSI-RS indexes configured in the RLM configurations for the active BWP when the UE declares RLF or HOF. The UE first fills in the *csi-rsRLMConfigBitmap-r16* to indicate the first 96 CSI-RS indexes and then *csi-rsRLMConfigBitmap-v1650* to indicate the latter 96 CSI-RS indexes. The first/leftmost bit in *csi-rsRLMConfigBitmap-r16* corresponds to CSI-RS index 0, the second bit corresponds to CSI-RS index 1. The first/leftmost bit in *csi-rsRLMConfigBitmap-v1650* corresponds to CSI-RS index 96, the second bit corresponds to CSI-RS index 97. These fields are included only if the *RadioLinkMonitoringConfig* for the respective BWP is configured.

c-RNTI

This field indicates the C-RNTI used in the PCell upon detecting radio link failure or the C-RNTI used in the source PCell upon handover failure.

failedPCellId

This field is used to indicate the PCell in which RLF is detected or the target PCell of the failed handover. For intra-NR handover *nrFailedPCellId* is included and for the handover from NR to EUTRA *eutraFailedPCellId* is included. The UE sets the ARFCN according to the frequency band used for transmission/ reception when the failure occurred.

failedPCellId-EUTRA

This field is used to indicate the PCell in which RLF is detected or the source PCell of the failed handover in an E-UTRA RLF report.

lastHO-Type

This field is used to indicate the type of the last executed handover before the last detected connection failure. The field is set to *cho* if the last executed handover was initiated by a conditional reconfiguration execution. The field is set to *daps* if the last executed handover was a DAPS handover.

measResultListEUTRA

This field refers to the last measurement results taken in the neighboring EUTRA Cells, when the radio link failure or handover failure happened.

measResultListNR

This field refers to the last measurement results taken in the neighboring NR Cells, when the radio link failure or handover failure happened.

measResultLastServCell

This field refers to the log measurement results taken in the PCell upon detecting radio link failure or the source PCell upon handover failure.

measResult-RLF-Report-EUTRA

Includes the E-UTRA RLF-Report-r9 IE as specified in TS 36.331 [10].

measResult-RLF-Report-EUTRA-v1690

Includes the E-UTRA RLF-Report-v9e0 IE as specified in TS 36.331 [10].

noSuitableCellFound

This field is set by the UE when the T311 expires.

previousPCellId

This field is used to indicate the source PCell of the last handover (source PCell when the last executed *RRCReconfiguration* message including *reconfigurationWithSync* was received). For intra-NR handover *nrPreviousCell* is included and for the handover from EUTRA to NR *eutraPreviousCell* is included.

ra-InformationCommon

This field is optionally included when connectionFailureType is set to 'hof' or when connectionFailureType is set to 'rlf' and the rlf-Cause equals to 'randomAccessProblem' or 'beamRecoveryFailure'; otherwise this field is absent.

reconnectCellId

This field is used to indicate the cell in which the UE comes back to connected after connection failure and after failing to perform reestablishment. If the UE comes back to RRC CONNECTED in an NR cell then nrReconnectCellID is included and if the UE comes back to RRC CONNECTED in an LTE cell then eutraReconnectCellID is included

reestablishmentCellId

If the UE was not configured with *conditionalReconfiguration* at the time of re-establishment attempt, or if the cell selected for the re-establishment attempt is not a candidate target cell for conditional reconfiguration, this field is used to indicate the cell in which the re-establishment attempt was made after connection failure.

rlf-Cause

This field is used to indicate the cause of the last radio link failure that was detected. In case of handover failure information reporting (i.e., the *connectionFailureType* is set to 'hof'), the UE is allowed to set this field to any value, except for the case in which a radio link failure was detected in the source PCell while performing a DAPS handover..

ssbRLMConfigBitmap

This field is used to indicate the SS/PBCH block indexes configured in the RLM configurations for the active BWP when the UE declares RLF or HOF. The first/leftmost bit corresponds to SSB index 0, the second bit corresponds to SSB index 1. This field is included only if the *RadioLinkMonitoringConfig* for the respective BWP is configured.

timeConnFailure

This field is used to indicate the time elapsed since the last HO execution until connection failure. Actual value = field value * 100ms. The maximum value 1023 means 102.3s or longer.

timeConnSourceDAPS-Failure

This field is used to indicate the time that elapsed between the last DAPS handover execution and the radio link failure detected in the source cell while T304 is running. Value in milliseconds. The maximum value 1023 means 1023ms or longer.

timeSinceFailure

This field is used to indicate the time that elapsed since the connection (radio link or handover) failure. Value in seconds. The maximum value 172800 means 172800s or longer. In the case of failure(s) (either at source or at target or at both) associated to DAPS handover, this field indicates the time elapsed since the latest connection (radio link or handover) failure.

timeSinceCHO-Reconfig

In case of handover failure, this field is used to indicate the time elapsed between the initiation of the last conditional reconfiguration execution towards the target cell and the reception of the latest conditional reconfiguration. In case of radio link failure, this field is used to indicate the time elapsed between the radio link failure and the reception of the latest conditional reconfiguration while connected to the source PCell. Actual value = field value * 100ms. The maximum value 1023 means 102.3s or longer.

timeUntilReconnection

This field is used to indicate the time that elapsed between the connection (radio link or handover) failure and the next time the UE comes to RRC CONNECTED in an NR or EUTRA cell, after failing to perform reestablishment. Value in seconds. The maximum value 172800 means 172800s or longer.

SuccessHO-Report field descriptions

c-RNTI

This field indicates the C-RNTI assigned by the target PCell of the handover for which the successful HO report was generated.

measResultListNR

This field refers to the last measurement results taken in the neighboring NR Cells when a successful handover is executed.

rlf-InSourceDAPS

This field indicates whether a radio link failure occurred at the source cell while T304 was running.

shr-Cause

This field is used to indicate the cause of the successful HO report.

sourceCellMeas

This field refers to the last measurement results taken in the source PCell of a handover in which the successful handover triggers the SuccessHO-Report.

sourcePCellId

This field is used to indicate the source PCell of a handover in which the successful handover triggers the SuccessHO-Report.

targetCellId

This field is used to indicate the target PCell of a handover in which the successful handover triggers the SuccessHO-Report.

targetCellMeas

This field refers to the last measurement results taken in the target PCell of a handover in which the successful handover triggers the SuccessHO-Report.

timeSinceCHO-Reconfig

This field is used to indicate the time elapsed between the initiation of the last conditional reconfiguration execution towards the target cell and the reception of the latest conditional reconfiguration for this target cell. Actual value = field value * 100ms. The maximum value 1023 means 102.3s or longer.

upInterruptionTimeAtHO

This field is used to indicate the time elapsed between the time of arrival of the last PDCP PDU received from the source cell for any data radio bearer and the time of arrival of the first non-duplicate PDCP PDU received from the target cell for any data radio bearer, and it is measured at the time of arrival of the first non-duplicate PDCP PDU received from the target cell for any data radio bearer. The field is set only in case of DAPS handover.

Value in milliseconds. The maximum value 1023 means 1023ms or longer.

UEPositioningAssistanceInfo

The *UEPositioningAssistanceInfo* message is used to provide positioning assistance information as requested by the Network.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

UEPositioningAssistanceInfo message

```
SEOUENCE {}
        criticalExtensionsFuture
UEPositioningAssistanceInfo-r17-IEs ::= SEOUENCE {
    ue-TxTEG-AssociationList-r17
                                            UE-TxTEG-AssociationList-r17
                                                                                  OPTIONAL,
   lateNonCriticalExtension
                                            OCTET STRING
                                                                                  OPTIONAL,
    nonCriticalExtension
                                            UEPositioningAssistanceInfo-v1720-IEs OPTIONAL
UEPositioningAssistanceInfo-v1720-IEs::=
                                            SEQUENCE {
    ue-TxTEG-TimingErrorMarginValue-r17
                                                ENUMERATED {tc0, tc2, tc4, tc6, tc8, tc12, tc16, tc20, tc24, tc32, tc40, tc48, tc56,
                                                            tc64, tc72, tc80}
                                                                                                                   OPTIONAL,
    nonCriticalExtension
                                                SEQUENCE {}
                                                                                                                   OPTIONAL
UE-TxTEG-AssociationList-r17 ::= SEQUENCE (SIZE (1..maxNrOfTxTEGReport-r17)) OF UE-TxTEG-Association-r17
UE-TxTEG-Association-r17 ::=
                                    SEOUENCE {
    ue-TxTEG-ID-r17
                                        INTEGER (0..maxNrOfTxTEG-ID-1-r17),
   nr-TimeStamp-r17
                                        NR-TimeStamp-r17,
    associatedSRS-PosResourceIdList-r17 SEQUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResourceId-r16,
    servCellId-r17
                                        ServCellIndex
                                                                                 OPTIONAL
NR-TimeStamp-r17 ::= SEOUENCE {
    nr-SFN-r17
                        INTEGER (0..1023),
    nr-Slot-r17
                         CHOICE {
       scs15-r17
                             INTEGER (0..9),
       scs30-r17
                             INTEGER (0..19),
                             INTEGER (0..39),
        scs60-r17
       scs120-r17
                             INTEGER (0..79)
-- TAG-UEPOSITIONINGASSISTANCEINFO-STOP
-- ASN1STOP
```

UEPositioningAssistanceInfo field descriptions

nr-TimeStamp

This field specifies the latest time instance at which the association is valid prior to the reporting.

servCeIIID

This field indicates the serving cell information of SRS for positioning resources associated to the UE Tx TEG report.

ue-TxTEG-ID

Identifies the ID of UE Tx TEG.

ue-TxTEG-TimingErrorMarginValue

This field specifies the UE Tx TEG timing error margin value of all the UE Tx TEGs within one *UEPositioningAssistanceInfo*. Value *tc0* corresponds to 0 Tc, *tc2* corresponds to 2 Tc and so on (see TS 37.355 [49]).

ULDedicatedMessageSegment

The *ULDedicatedMessageSegment* message is used to transfer segments of the *UECapabilityInformation* or *MeasurementReportAppLayer* message. SRB1 is used at transfer of segments of *UECapabilityInformation* and SRB4 is used at transfer of segments of *MeasurementReportAppLayer*.

Signalling radio bearer: SRB1 or SRB4

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

ULDedicatedMessageSegment message

```
-- ASN1START
-- TAG-ULDEDICATEDMESSAGESEGMENT-START
ULDedicatedMessageSegment-r16 ::=
                                        SEQUENCE {
    criticalExtensions
                                            CHOICE {
       ulDedicatedMessageSegment-r16
                                                 ULDedicatedMessageSegment-r16-IEs,
        criticalExtensionsFuture
                                                 SEOUENCE {}
ULDedicatedMessageSegment-r16-IEs ::=
                                        SEQUENCE {
    segmentNumber-r16
                                          INTEGER (0..15),
OCTET STRING,
ENUMERATED {notLastSegment, lastSegment},
    rrc-MessageSegmentContainer-r16
    rrc-MessageSegmentType-r16
    lateNonCriticalExtension
                                              OCTET STRING
                                                                                              OPTIONAL,
    nonCriticalExtension
                                              SEOUENCE {}
                                                                                              OPTIONAL
-- TAG-ULDEDICATEDMESSAGESEGMENT-STOP
```

ULDedicatedMessageSegment field descriptions

segmentNumber

-- ASN1STOP

Identifies the sequence number of a segment within the encoded UL DCCH message.

rrc-MessageSegmentContainer

Includes a segment of the encoded UL DCCH message. The size of the included segment in this container should be small enough that the resulting encoded RRC message PDU is less than or equal to the PDCP SDU size limit.

rrc-MessageSegmentType

Indicates whether the included UL DCCH message segment is the last segment or not.

ULInformationTransfer

The *ULInformationTransfer* message is used for the uplink transfer of NAS or non-3GPP dedicated information, or IAB-DU specific F1-C related information.

Signalling radio bearer: SRB2 or SRB1 (only if SRB2 not established yet). If SRB2 is suspended, the UE does not send this message until SRB2 is resumed. If only *dedicatedInfoF1c* is included, SRB2 is used.

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to network

ULInformationTransfer message

```
-- ASN1START
-- TAG-ULINFORMATIONTRANSFER-START
ULInformationTransfer ::=
                                   SEQUENCE {
    criticalExtensions
                                       CHOICE {
       ulInformationTransfer
                                           ULInformationTransfer-IEs,
       criticalExtensionsFuture
                                           SEQUENCE {}
ULInformationTransfer-IEs ::=
                                   SEQUENCE {
    dedicatedNAS-Message
                                       DedicatedNAS-Message
                                                                           OPTIONAL,
   lateNonCriticalExtension
                                       OCTET STRING
                                                                           OPTIONAL,
    nonCriticalExtension
                                       ULInformationTransfer-v1700-IEs
                                                                           OPTIONAL
ULInformationTransfer-v1700-IEs ::=
                                         SEOUENCE {
    dedicatedInfoF1c-r17
                                             DedicatedInfoF1c-r17
                                                                                 OPTIONAL,
    nonCriticalExtension
                                             SEQUENCE {}
                                                                                 OPTIONAL
-- TAG-ULINFORMATIONTRANSFER-STOP
-- ASN1STOP
```

ULInformationTransferIRAT

The *ULInformationTransferIRAT* message is used for the uplink transfer of information terminated at NR MCG but specified by another RAT. In this version of the specification, the message is used for V2X sidelink communication messages specified in TS 36.331 [10].

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to network

ULInformationTransferIRAT message

```
-- ASN1START
-- TAG-ULINFORMATIONTRANSFERIRAT-START
ULInformationTransferIRAT-r16 ::=
    criticalExtensions
                                                      CHOICE {
       c1
                                                             CHOICE {
           ulInformationTransferIRAT-r16
                                                             ULInformationTransferIRAT-r16-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                                    SEQUENCE {}
ULInformationTransferIRAT-r16-IEs ::=
                                             SEOUENCE {
    ul-DCCH-MessageEUTRA-r16
                                                       OCTET STRING
                                                                               OPTIONAL,
   lateNonCriticalExtension
                                                       OCTET STRING
                                                                                OPTIONAL,
    nonCriticalExtension
                                                       SEOUENCE {}
                                                                                 OPTIONAL
-- TAG-ULINFORMATIONTRANSFERIRAT-STOP
-- ASN1STOP
```

ULInformationTransferIRAT field descriptions

ul-DCCH-MessageEUTRA

Includes the *UL-DCCH-Message* as defined in TS 36.331 [10]. In this version of the specification, the field is only used to transfer the E-UTRA RRC *MeasurementReport*, E-UTRA RRC *SidelinkUEInformation* and the E-UTRA RRC *UEAssistanceInformation messages*.

ULInformationTransferMRDC

The *ULInformationTransferMRDC* message is used for the uplink transfer of MR-DC dedicated information (e.g. for transferring the NR or E-UTRA RRC *MeasurementReport* message, the *FailureInformation* message, the *UEAssistanceInformation* message, the *RRCReconfigurationComplete* message, the *IABOtherInformation* message or the NR or E-UTRA RRC *MCGFailureInformation* message).

Signalling radio bearer: SRB1, SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

ULInformationTransferMRDC message

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```
-- ASN1START
-- TAG-ULINFORMATIONTRANSFERMRDC-START
ULInformationTransferMRDC ::=
                                            SEOUENCE {
    criticalExtensions
                                                CHOICE {
                                                    CHOICE {
       c1
           ulInformationTransferMRDC
                                                        ULInformationTransferMRDC-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                            SEOUENCE {}
ULInformationTransferMRDC-IEs::=
                                           SEOUENCE {
    ul-DCCH-MessageNR
                                                OCTET STRING
                                                                                OPTIONAL.
    ul-DCCH-MessageEUTRA
                                                OCTET STRING
                                                                                OPTIONAL,
   lateNonCriticalExtension
                                                OCTET STRING
                                                                                OPTIONAL,
    nonCriticalExtension
                                                SEQUENCE {}
                                                                                OPTIONAL
-- TAG-ULINFORMATIONTRANSFERMRDC-STOP
-- ASN1STOP
```

ULInformationTransferMRDC field descriptions

ul-DCCH-MessageNR

Includes the *UL-DCCH-Message*. In this version of the specification, the field is only used to transfer the NR RRC *MeasurementReport*, *RRCReconfigurationComplete*, *UEAssistanceInformation*, FailureInformation, and *IABOtherInformation* messages when sent via SRB1 and to transfer the NR *MCGFailureInformation* message when sent via SRB3.

ul-DCCH-MessageEUTRA

Includes the *UL-DCCH-Message*. In this version of the specification, the field is only used to transfer the E-UTRA RRC *MeasurementReport* message when sent via SRB1 and to transfer the E-UTRA *MCGFailureInformation* message when sent via SRB3.

6.3 RRC information elements

6.3.0 Parameterized types

SetupRelease

SetupRelease allows the ElementTypeParam to be used as the referenced data type for the setup and release entries. See A.3.8 for guidelines.

```
-- ASN1START-- TAG-SETUPRELEASE-START
```

6.3.1 System information blocks

– SIB2

SIB2 contains cell re-selection information common for intra-frequency, inter-frequency and/or inter-RAT cell re-selection (i.e. applicable for more than one type of cell re-selection but not necessarily all) as well as intra-frequency cell re-selection information other than neighbouring cell related.

SIB2 information element

```
-- ASN1START
-- TAG-SIB2-START
SIB2 ::=
                                     SEOUENCE {
                                        SEOUENCE
    cellReselectionInfoCommon
        nrofSS-BlocksToAverage
                                             INTEGER (2..maxNrofSS-BlocksToAverage)
                                                                                              OPTIONAL,
                                                                                                               -- Need S
        absThreshSS-BlocksConsolidation
                                             ThresholdNR
                                                                                              OPTIONAL,
                                                                                                               -- Need S
                                             RangeToBestCell
        rangeToBestCell
                                                                                              OPTIONAL,
                                                                                                               -- Need R
        q-Hyst
                                             ENUMERATED {
                                                 dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
                                                 dB12, dB14, dB16, dB18, dB20, dB22, dB24},
        speedStateReselectionPars
                                             SEQUENCE {
            mobilityStateParameters
                                                 MobilityStateParameters,
            q-HystSF
                                             SEQUENCE {
                sf-Medium
                                                 ENUMERATED {dB-6, dB-4, dB-2, dB0}
                                                 ENUMERATED {dB-6, dB-4, dB-2, dB0}
                sf-High
                                                                                              OPTIONAL,
                                                                                                               -- Need R
    cellReselectionServingFreqInfo
                                         SEQUENCE {
        s-NonIntraSearchP
                                             ReselectionThreshold
                                                                                              OPTIONAL,
                                                                                                               -- Need S
                                             ReselectionThresholdO
        s-NonIntraSearch0
                                                                                              OPTIONAL,
                                                                                                               -- Need S
        threshServingLowP
                                             ReselectionThreshold,
        threshServingLowQ
                                             ReselectionThreshold0
                                                                                              OPTIONAL,
                                                                                                               -- Need R
        cellReselectionPriority
                                             CellReselectionPriority,
        cellReselectionSubPriority
                                             CellReselectionSubPriority
                                                                                              OPTIONAL,
                                                                                                               -- Need R
    intraFreqCellReselectionInfo
                                         SEQUENCE {
        q-RxLevMin
                                             Q-RxLevMin,
                                             O-RxLevMin
        q-RxLevMinSUL
                                                                                              OPTIONAL,
                                                                                                               -- Need R
```

```
O-OualMin
    q-OualMin
                                                                                          OPTIONAL,
                                                                                                           -- Need S
    s-IntraSearchP
                                         ReselectionThreshold,
    s-IntraSearchO
                                         ReselectionThresholdO
                                                                                          OPTIONAL.
                                                                                                           -- Need S
    t-ReselectionNR
                                         T-Reselection,
    frequencyBandList
                                         MultiFrequencyBandListNR-SIB
                                                                                          OPTIONAL.
                                                                                                           -- Need S
                                         MultiFrequencyBandListNR-SIB
                                                                                                           -- Need R
    frequencyBandListSUL
                                                                                          OPTIONAL,
                                         P-Max
                                                                                          OPTIONAL,
                                                                                                           -- Need S
    p-Max
    smtc
                                         SSB-MTC
                                                                                          OPTIONAL,
                                                                                                           -- Need S
    ss-RSST-Measurement
                                         SS-RSSI-Measurement
                                                                                          OPTIONAL,
                                                                                                           -- Need R
    ssb-ToMeasure
                                         SSB-ToMeasure
                                                                                          OPTIONAL,
                                                                                                           -- Need S
    deriveSSB-IndexFromCell
                                         BOOLEAN,
    . . . ,
    Π
   t-ReselectionNR-SF
                                         SpeedStateScaleFactors
                                                                                          OPTIONAL
                                                                                                           -- Need N
   ]],
   11
    smtc2-LP-r16
                                         SSB-MTC2-LP-r16
                                                                                                            -- Need R
                                                                                          OPTIONAL,
    ssb-PositionOCL-Common-r16
                                         SSB-PositionOCL-Relation-r16
                                                                                                            -- Cond SharedSpectrum
                                                                                          OPTIONAL
   ]],
    11
    ssb-PositionQCL-Common-r17
                                         SSB-PositionQCL-Relation-r17
                                                                                          OPTIONAL
                                                                                                            -- Cond SharedSpectrum2
   ]],
   ] ]
    smtc4list-r17
                                         SSB-MTC4List-r17
                                                                                          OPTIONAL
                                                                                                            -- Need R
   ]]
},
. . . ,
[ [
relaxedMeasurement-r16
                                     SEOUENCE {
   lowMobilityEvaluation-r16
                                         SEOUENCE {
        s-SearchDeltaP-r16
                                             ENUMERATED -
                                                 dB3, dB6, dB9, dB12, dB15,
                                                 spare3, spare2, spare1},
                                             ENUMERATED {
        t-SearchDeltaP-r16
                                                 s5, s10, s20, s30, s60, s120, s180,
                                                 s240, s300, spare7, spare6, spare5,
                                                 spare4, spare3, spare2, spare1}
                                                                                          OPTIONAL,
                                                                                                           -- Need R
    cellEdgeEvaluation-r16
                                         SEOUENCE {
        s-SearchThresholdP-r16
                                             ReselectionThreshold,
        s-SearchThresholdQ-r16
                                             ReselectionThresholdQ
                                                                                                           -- Need R
                                                                                          OPTIONAL
                                                                                          OPTIONAL,
                                                                                                           -- Need R
    combineRelaxedMeasCondition-r16
                                         ENUMERATED {true}
                                                                                                           -- Need R
                                                                                          OPTIONAL,
   highPriorityMeasRelax-r16
                                         ENUMERATED {true}
                                                                                                           -- Need R
                                                                                          OPTIONAL
                                                                                          OPTIONAL
                                                                                                           -- Need R
]],
cellEquivalentSize-r17
                                         INTEGER(2..16)
                                                                                          OPTIONAL,
                                                                                                           -- Cond HSDN
relaxedMeasurement-r17
                                         SEQUENCE {
    stationaryMobilityEvaluation-r17
                                             SEOUENCE {
                                                 ENUMERATED {dB2, dB3, dB6, dB9, dB12, dB15, spare2, spare1},
        s-SearchDeltaP-Stationary-r17
        t-SearchDeltaP-Stationary-r17
                                                 ENUMERATED {s5, s10, s20, s30, s60, s120, s180, s240, s300, spare7, spare6, spare5,
                                                             spare4, spare3, spare2, spare1}
    },
```

OPTIONAL -- Need R
OPTIONAL, -- Need R
OPTIONAL -- Need R
OPTIONAL -- Need R

SIB2 field descriptions

absThreshSS-BlocksConsolidation

Threshold for consolidation of L1 measurements per RS index. If the field is absent, the UE uses the measurement quantity as specified in TS 38.304 [20].

cellEdgeEvaluation

Indicates the criteria for a UE to detect that it is not at cell edge, in order to relax measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9.2).

cellEdgeEvaluationWhileStationary

Indicates the criteria for a UE to detect that it is not at cell edge while stationary, in order to relax measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9.4).

cellEquivalentSize

The number of cell count used for mobility state estimation for this cell as specified in TS 38.304 [20].

cellReselectionInfoCommon

Cell re-selection information common for intra-frequency, inter-frequency and/ or inter-RAT cell re-selection.

cellReselectionServingFreqInfo

Information common for non-intra-frequency cell re-selection i.e. cell re-selection to inter-frequency and inter-RAT cells.

combineRelaxedMeasCondition

When both *lowMobilityEvalutation* and *cellEdgeEvalutation* criteria are present in SIB2, this parameter configures the UE to fulfil both criteria in order to relax measurement requirements for cell reselection. If the field is absent, the UE is allowed to relax measurement requirements for cell reselection when either or both of the criteria are met. (See TS 38.304 [20], clause 5.2.4.9.0)

combineRelaxedMeasCondition2

When both stationaryMobilityEvaluation and cellEdgeEvaluationWhileStationary criteria are present in SIB2, this parameter configures the UE to fulfil both criteria in order to relax measurement requirements for cell reselection. If the field is absent, the UE is allowed to relax measurement requirements for cell reselection when only the stationary criteria is met. (See TS 38.304 [20], clause 5.2.4.9.0)

deriveSSB-IndexFromCell

This field indicates whether the UE can utilize serving cell timing to derive the index of SS block transmitted by neighbour cell. If this field is set to *true*, the UE assumes SFN and frame boundary alignment across cells on the serving frequency as specified in TS 38.133 [14].

frequencyBandList

Indicates the list of frequency bands for which the NR cell reselection parameters apply. The UE behaviour in case the field is absent is described in clause 5.2.2.4.3.

highPriorityMeasRelax

Indicates whether measurements can be relaxed on high priority frequencies. If the field is absent, the UE shall not relax measurements on high priority frequencies beyond "Thigher priority search" unless both low mobility and not at cell edge criteria are fulfilled (see TS 38.133 [14], clauses 4.2.2.7, 4.2.2.10 and 4.2.2.11).

intraFreqCellReselectionInfo

Cell re-selection information common for intra-frequency cells.

IowMobilitvEvaluation

Indicates the criteria for a UE to detect low mobility, in order to relax measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9.1).

nrofSS-BlocksToAverage

Number of SS blocks to average for cell measurement derivation. If the field is absent the UE uses the measurement quantity as specified in TS 38.304 [20].

p-Max

Value in dBm applicable for the intra-frequency neighbouring NR cells. If absent the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell or TS 38.101-2 [39] in case of an FR2 cell. In this release of the specification, if *p-Max* is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. This field is ignored by IAB-MT. The IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63].

q-Hyst

Parameter "Q_{hyst}" in TS 38.304 [20], Value in dB. Value dB1 corresponds to 1 dB, dB2 corresponds to 2 dB and so on.

q-HystSF

Parameter "Speed dependent ScalingFactor for Qhyst" in TS 38.304 [20]. The *sf-Medium* and *sf-High* concern the additional hysteresis to be applied, in Medium and High Mobility state respectively, to Qhyst as defined in TS 38.304 [20]. In dB. Value *dB-6* corresponds to -6dB, *dB-4* corresponds to -4dB and so on.

SIB2 field descriptions

q-QualMin

Parameter "Q_{qualmin}" in TS 38.304 [20], applicable for intra-frequency neighbour cells. If the field is absent, the UE applies the (default) value of negative infinity for Q_{qualmin}.

q-RxLevMin

Parameter "Q_{rxlevmin}" in TS 38.304 [20], applicable for intra-frequency neighbour cells.

q-RxLevMinSUL

Parameter "Q_{rxlevmin}" in TS 38.304 [20], applicable for intra-frequency neighbour cells.

rangeToBestCell

Parameter "rangeToBestCell" in TS 38.304 [20]. The network configures only non-negative (in dB) values.

relaxedMeasurement

Configuration to allow relaxation of RRM measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9).

s-IntraSearchP

Parameter "S_{IntraSearchP}" in TS 38.304 [20].

s-IntraSearchQ

Parameter "SIntraSearchQ" in TS 38.304 [20]. If the field is absent, the UE applies the (default) value of 0 dB for SIntraSearchQ.

s-NonIntraSearchP

Parameter "SponlotraSearchp" in TS 38.304 [20]. If this field is absent, the UE applies the (default) value of infinity for SponlotraSearchp.

s-NonIntraSearchQ

Parameter "SnonIntraSearchQ" in TS 38.304 [20]. If the field is absent, the UE applies the (default) value of 0 dB for SnonIntraSearchQ.

s-SearchDeltaP

Parameter "SsearchDeltaP" in TS 38.304 [20]. Value dB3 corresponds to 3 dB, dB6 corresponds to 6 dB and so on.

s-SearchDeltaP-Stationary

Parameter "SsearchDeltaP-Stationary" in TS 38.304 [20]. Value dB2 corresponds to 2 dB, dB3 corresponds to 3 dB and so on.

s-SearchThresholdP. s-SearchThresholdP2

Parameters "SsearchThresholdP" and "SsearchThresholdP2" in TS 38.304 [20]. The network configures s-SearchThresholdP and s-SearchThresholdP2 to be less than or equal to s-IntraSearchP and s-NonIntraSearchP.

s-SearchThresholdQ. s-SearchThresholdQ2

Parameters "SsearchThresholdQ" and "SsearchThresholdQ2" in TS 38.304 [20]. The network configures s-SearchThresholdQ and s-SearchThresholdQ2 to be less than or equal to s-IntraSearchQ and s-NonIntraSearchQ.

smtc

Measurement timing configuration for intra-frequency measurement. If this field is absent, the UE assumes that SSB periodicity is 5 ms for the intra-frequency cells. If the field is broadcast by an NTN cell, the *offset* (derived from parameter *periodicityAndOffset*) is based on the assumption that service link propagation delay difference between the serving cell and neighbour cells equals to 0 ms, and UE can adjust the actual *offset* based on the actual propagation delay difference.

smtc2-LP

Measurement timing configuration for intra-frequency neighbour cells with a Long Periodicity (LP) indicated by periodicity in *smtc2-LP*. The timing offset and duration are equal to the offset and duration indicated in *smtc* in *intraFreqCellReselectionInfo*. The periodicity in *smtc2-LP* can only be set to a value strictly larger than the periodicity in *smtc* in *intraFreqCellReselectionInfo* (e.g. if *smtc* indicates sf20 the Long Periodicity can only be set to sf40, sf80 or sf160, if *smtc* indicates sf160, *smtc2-LP* cannot be configured). The *pci-List*, if present, includes the physical cell identities of the intra-frequency neighbour cells with Long Periodicity. If *smtc2-LP* is absent, the UE assumes that there are no intra-frequency neighbour cells with a Long Periodicity.

smtc4list

Measurement timing configuration list for NTN deployments, see clause 5.5.2.10. The offset of each SSB-MTC4 in *smtc4list* is based on the assumption that service link propagation delay difference between the serving cell and neighbour cells equals to 0 ms, and UE can adjust the actual *offset* based on the actual propagation delay difference. For a UE that supports less SMTCs than what is included in this list, it is up to the UE to select which SMTCs to consider.

ssb-PositionQCL-Common

Indicates the QCL relation between SS/PBCH blocks for intra-frequency neighbor cells as specified in TS 38.213 [13], clause 4.1.

SIB2 field descriptions

ssb-ToMeasure

The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]). When the field is absent the UE measures on all SS-blocks.

stationaryMobilityEvaluation

Indicates the criteria for a UE to detect stationary mobility, in order to relax measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9.0).

t-ReselectionNR

Parameter "Treselection_{NR}" in TS 38.304 [20].

t-ReselectionNR-SF

Parameter "Speed dependent ScalingFactor for Treselection_{NR}" in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20].

threshServingLowP

Parameter "Thresh_{Serving, LowP}" in TS 38.304 [20].

threshServingLowQ

Parameter "Thresh_{Serving, LowQ}" in TS 38.304 [20].

t-SearchDeltaP

Parameter "T_{SearchDeltaP}" in TS 38.304 [20]. Value in seconds. Value s5 means 5 seconds, value s10 means 10 seconds and so on.

t-SearchDeltaP-Stationary

Parameter "T_{SearchDeltaP-Stationary}" in TS 38.304 [20]. Value in seconds. Value s5 means 5 seconds, value s10 means 10 seconds and so on.

Conditional Presence	Explanation
HSDN	The field is optionally present, Need R, if speedStateReselectionPars is present; otherwise the field is not present.
SharedSpectrum	This field is mandatory present if this intra-frequency operates with shared spectrum channel access in FR1. Otherwise, it is absent, Need R.
SharedSpectrum2	This field is optionally present if this intra-frequency operates with shared spectrum channel access in FR2-2, Need R. Otherwise, it is absent, Need R.

- SIB3

SIB3 contains neighbouring cell related information relevant only for intra-frequency cell re-selection. The IE includes cells with specific re-selection parameters as well as exclude-listed cells.

SIB3 information element

```
-- ASN1START
-- TAG-SIB3-START
SIB3 ::=
    intraFreqNeighCellList
                                       IntraFreqNeighCellList
                                                                                                      OPTIONAL, -- Need R
   intraFreqExcludedCellList
                                       IntraFreqExcludedCellList
                                                                                                      OPTIONAL, -- Need R
   lateNonCriticalExtension
                                       OCTET STRING
                                                                                                      OPTIONAL,
    . . . ,
    [ [
    intraFreqNeighCellList-v1610
                                       IntraFreqNeighCellList-v1610
                                                                                                      OPTIONAL, -- Need R
    intraFreqAllowedCellList-r16
                                       IntraFreqAllowedCellList-r16
                                                                                                      OPTIONAL, -- Cond SharedSpectrum2
    intraFreqCAG-CellList-r16
                                       SEQUENCE (SIZE (1..maxPLMN)) OF IntraFreqCAG-CellListPerPLMN-r16 OPTIONAL -- Need R
    ]],
```

```
intraFreqNeighHSDN-CellList-r17
                                        IntraFreqNeighHSDN-CellList-r17
                                                                                                        OPTIONAL,
                                                                                                                     -- Need R
    intraFreqNeighCellList-v1710
                                        IntraFreqNeighCellList-v1710
                                                                                                        OPTIONAL
                                                                                                                     -- Need R
    ]],
    Π
    channelAccessMode2-r17
                                        ENUMERATED {enabled}
                                                                                                        OPTIONAL
                                                                                                                     -- Need R
    11
IntraFreqNeighCellList ::=
                                    SEQUENCE (SIZE (1..maxCellIntra)) OF IntraFreqNeighCellInfo
IntraFreqNeighCellList-v1610::=
                                    SEQUENCE (SIZE (1..maxCellIntra)) OF IntraFreqNeighCellInfo-v1610
IntraFreqNeighCellList-v1710 ::=
                                    SEQUENCE (SIZE (1...maxCellIntra)) OF IntraFreqNeighCellInfo-v1710
IntraFreqNeighCellInfo ::=
                                    SEOUENCE {
    physCellId
                                       PhysCellId,
    q-OffsetCell
                                       O-OffsetRange,
    q-RxLevMinOffsetCell
                                       INTEGER (1..8)
                                                                                        OPTIONAL, -- Need R
                                                                                        OPTIONAL, -- Need R
    q-RxLevMinOffsetCellSUL
                                       INTEGER (1..8)
    q-QualMinOffsetCell
                                       INTEGER (1..8)
                                                                                        OPTIONAL, -- Need R
IntraFreqNeighCellInfo-v1610 ::=
                                     SEOUENCE {
    ssb-PositionQCL-r16
                                        SSB-PositionOCL-Relation-r16
                                                                                        OPTIONAL -- Cond SharedSpectrum2
IntraFreqNeighCellInfo-v1710 ::=
                                     SEOUENCE {
    ssb-PositionQCL-r17
                                                                                        OPTIONAL -- Cond SharedSpectrum2
                                        SSB-PositionQCL-Relation-r17
IntraFreqExcludedCellList ::=
                                    SEQUENCE (SIZE (1..maxCellExcluded)) OF PCI-Range
IntraFreqAllowedCellList-r16 ::=
                                    SEQUENCE (SIZE (1..maxCellAllowed)) OF PCI-Range
IntraFreqCAG-CellListPerPLMN-r16 ::= SEQUENCE {
    plmn-IdentityIndex-r16
                                         INTEGER (1..maxPLMN),
    caq-CellList-r16
                                         SEQUENCE (SIZE (1..maxCAG-Cell-r16)) OF PCI-Range
IntraFreqNeighHSDN-CellList-r17 ::= SEQUENCE (SIZE (1..maxCellIntra)) OF PCI-Range
-- TAG-SIB3-STOP
-- ASN1STOP
```

SIB3 field descriptions

channelAccessMode2

If present, this field indicates that intra-frequency neighbor cells apply channel access mode procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2. If absent, the intra-frequency neighbor cells do not apply any channel access procedure.

intraFreqAllowedCellList

List of allow-listed intra-frequency neighbouring cells, see TS 38.304 [20], clause 5.2.4.

intraFreqCAG-CellList

List of intra-frequency neighbouring CAG cells (as defined in TS 38.304 [20]) per PLMN.

intraFregExcludedCellList

List of exclude-listed intra-frequency neighbouring cells.

intraFreqNeighCellList

List of intra-frequency neighbouring cells with specific cell re-selection parameters. If *intraFreqNeighCellList-v1610* is present, it shall contain the same number of entries, listed in the same order as in *intraFreqNeighCellList* (without suffix).

intraFregNeighHSDN-CellList

List of intra-frequency neighbouring HSDN cells as specified in TS 38.304 [20].

q-OffsetCell

Parameter "Qoffsets,n" in TS 38.304 [20].

q-QualMinOffsetCell

Parameter "Q_{qualminoffsetcell}" in TS 38.304 [20]. Actual value Q_{qualminoffsetcell} = field value [dB].

a-RxLevMinOffsetCell

Parameter "Qrxlevminoffsetcell" in TS 38.304 [20]. Actual value Qrxlevminoffsetcell = field value * 2 [dB].

a-RxLevMinOffsetCellSUL

Parameter "QrxlevminoffsetcellSUL" in TS 38.304 [20]. Actual value QrxlevminoffsetcellSUL = field value * 2 [dB].

ssb-PositionQCL

Indicates the QCL relation between SS/PBCH blocks for a specific intra-frequency neighbor cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the value signalled by ssb-PositionQCL-Common in SIB2 for the indicated cell.

Conditional Presence	Explanation
SharedSpectrum2	The field is optional present, Need R, if this intra-frequency or neighbor cell operates with shared spectrum channel access.
·	Otherwise, it is absent, Need R.

– SIB4

SIB4 contains information relevant for inter-frequency cell re-selection (i.e. information about other NR frequencies and inter-frequency neighbouring cells relevant for cell re-selection), which can also be used for NR idle/inactive measurements. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

SIB4 information element

```
-- ASN1START
-- TAG-SIB4-START

SIB4 ::= SEQUENCE {
   interFreqCarrierFreqList InterFreqCarrierFreqList,
```

```
lateNonCriticalExtension
                                        OCTET STRING
                                                                                    OPTIONAL,
    interFreqCarrierFreqList-v1610
                                        InterFregCarrierFregList-v1610
                                                                                    OPTIONAL -- Need R
    11.
    ] ]
    interFregCarrierFregList-v1700
                                        InterFregCarrierFregList-v1700
                                                                                    OPTIONAL
                                                                                              -- Need R
    Π
    interFreqCarrierFreqList-v1720
                                        InterFreqCarrierFreqList-v1720
                                                                                    OPTIONAL
                                                                                              -- Need R
    ]],
    11
                                        InterFregCarrierFregList-v1730
    interFreqCarrierFreqList-v1730
                                                                                    OPTIONAL -- Need R
    11
InterFreqCarrierFreqList ::=
                                    SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo
InterFreqCarrierFreqList-v1610 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1610
InterFreqCarrierFreqList-v1700 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1700
InterFreqCarrierFreqList-v1720 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1720
InterFreqCarrierFreqList-v1730 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1730
InterFreqCarrierFreqInfo ::=
                                    SEQUENCE {
    dl-CarrierFreq
                                        ARFCN-ValueNR,
    frequencyBandList
                                        MultiFrequencyBandListNR-SIB
                                                                                                    OPTIONAL,
                                                                                                                -- Cond Mandatory
                                                                                                                -- Need R
    frequencyBandListSUL
                                        MultiFrequencyBandListNR-SIB
                                                                                                    OPTIONAL,
                                        INTEGER (2..maxNrofSS-BlocksToAverage)
                                                                                                                -- Need S
    nrofSS-BlocksToAverage
                                                                                                    OPTIONAL,
    absThreshSS-BlocksConsolidation
                                        ThresholdNR
                                                                                                    OPTIONAL,
                                                                                                                -- Need S
                                        SSB-MTC
                                                                                                    OPTIONAL,
                                                                                                                -- Need S
    ssbSubcarrierSpacing
                                        SubcarrierSpacing,
    ssb-ToMeasure
                                        SSB-ToMeasure
                                                                                                    OPTIONAL,
                                                                                                                -- Need S
    deriveSSB-IndexFromCell
                                        BOOLEAN.
    ss-RSSI-Measurement
                                        SS-RSSI-Measurement
                                                                                                    OPTIONAL,
                                                                                                                -- Need R
    q-RxLevMin
                                        O-RxLevMin,
                                        O-RxLevMin
                                                                                                                -- Need R
    q-RxLevMinSUL
                                                                                                    OPTIONAL,
    q-QualMin
                                        O-OualMin
                                                                                                    OPTIONAL,
                                                                                                                -- Need S
                                                                                                                -- Need S
    p-Max
                                        P-Max
                                                                                                    OPTIONAL,
    t-ReselectionNR
                                        T-Reselection.
                                        SpeedStateScaleFactors
                                                                                                                -- Need S
    t-ReselectionNR-SF
                                                                                                    OPTIONAL,
                                        ReselectionThreshold,
    threshX-HighP
    threshX-LowP
                                        ReselectionThreshold,
    threshX-0
                                        SEOUENCE {
        threshX-HighO
                                            ReselectionThresholdO,
        threshX-LowQ
                                            ReselectionThresholdQ
                                                                                                    OPTIONAL,
                                                                                                                -- Cond RSRO
                                                                                                    OPTIONAL, -- Need R
    cellReselectionPriority
                                        CellReselectionPriority
                                                                                                    OPTIONAL, -- Need R
    cellReselectionSubPriority
                                        CellReselectionSubPriority
    q-OffsetFreq
                                        O-OffsetRange
                                                                                                    DEFAULT dB0,
    interFreqNeighCellList
                                        InterFreqNeighCellList
                                                                                                    OPTIONAL, -- Need R
    interFreqExcludedCellList
                                        InterFreqExcludedCellList
                                                                                                    OPTIONAL, -- Need R
```

```
InterFreqCarrierFreqInfo-v1610 ::= SEQUENCE {
    interFreqNeighCellList-v1610
                                        InterFreqNeighCellList-v1610
                                                                                                    OPTIONAL.
                                                                                                                 -- Need R
    smtc2-LP-r16
                                        SSB-MTC2-LP-r16
                                                                                                                 -- Need R
                                                                                                    OPTIONAL,
    interFreqAllowedCellList-r16
                                       InterFregAllowedCellList-r16
                                                                                                    OPTIONAL,
                                                                                                                 -- Cond SharedSpectrum2
                                                                                                                 -- Cond SharedSpectrum
    ssb-PositionOCL-Common-r16
                                        SSB-PositionOCL-Relation-r16
                                                                                                    OPTIONAL,
    interFreqCAG-CellList-r16
                                        SEQUENCE (SIZE (1..maxPLMN)) OF InterFreqCAG-CellListPerPLMN-r16 OPTIONAL
                                                                                                                       -- Need R
InterFreqCarrierFreqInfo-v1700 ::= SEQUENCE {
    interFreqNeighHSDN-CellList-r17
                                        InterFreqNeighHSDN-CellList-r17
                                                                                                    OPTIONAL.
                                                                                                                 -- Need R
    highSpeedMeasInterFreq-r17
                                        ENUMERATED {true}
                                                                                                    OPTIONAL,
                                                                                                                 -- Need R
    redCapAccessAllowed-r17
                                        ENUMERATED {true}
                                                                                                    OPTIONAL,
                                                                                                                 -- Need R
    ssb-PositionQCL-Common-r17
                                        SSB-PositionOCL-Relation-r17
                                                                                                    OPTIONAL,
                                                                                                                 -- Cond SharedSpectrum
    interFreqNeighCellList-v1710
                                       InterFreqNeighCellList-v1710
                                                                                                    OPTIONAL
                                                                                                                 -- Cond SharedSpectrum2
InterFreqCarrierFreqInfo-v1720 ::= SEQUENCE {
    smtc4list-r17
                                        SSB-MTC4List-r17
                                                                                                    OPTIONAL
                                                                                                                 -- Need R
InterFreqCarrierFreqInfo-v1730 ::= SEQUENCE {
    channelAccessMode2-r17
                                        ENUMERATED {enabled}
                                                                                                    OPTIONAL
                                                                                                                 -- Need R
InterFreqNeighHSDN-CellList-r17 ::= SEQUENCE (SIZE (1..maxCellInter)) OF PCI-Range
InterFreqNeighCellList ::=
                                    SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo
                                    SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo-v1610
InterFreqNeighCellList-v1610 ::=
                                    SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo-v1710
InterFreqNeighCellList-v1710 ::=
InterFreqNeighCellInfo ::=
                                    SEQUENCE {
    physCellId
                                       PhysCellId,
    q-OffsetCell
                                       O-OffsetRange,
    q-RxLevMinOffsetCell
                                       INTEGER (1..8)
                                                                                                    OPTIONAL, -- Need R
    q-RxLevMinOffsetCellSUL
                                       INTEGER (1..8)
                                                                                                    OPTIONAL, -- Need R
                                                                                                    OPTIONAL, -- Need R
                                       INTEGER (1..8)
    q-QualMinOffsetCell
InterFreqNeighCellInfo-v1610 ::=
                                        SSB-PositionQCL-Relation-r16
    ssb-PositionQCL-r16
                                                                                                    OPTIONAL
                                                                                                                -- Cond SharedSpectrum2
InterFreqNeighCellInfo-v1710 ::=
                                    SEQUENCE {
    ssb-PositionOCL-r17
                                        SSB-PositionOCL-Relation-r17
                                                                                                    OPTIONAL
                                                                                                                -- Cond SharedSpectrum2
InterFreqExcludedCellList ::=
                                    SEQUENCE (SIZE (1..maxCellExcluded)) OF PCI-Range
```

SIB4 field descriptions

absThreshSS-BlocksConsolidation

Threshold for consolidation of L1 measurements per RS index. If the field is absent, the UE uses the measurement quantity as specified in TS 38.304 [20].

channelAccessMode2

If present, this field indicates that the neighbor cells on the inter-frequency apply channel access mode procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2. If absent, the neighbor cells on the inter-frequency do not apply any channel access procedure.

deriveSSB-IndexFromCell

This field indicates whether the UE may use the timing of any detected cell on that frequency to derive the SSB index of all neighbour cells on that frequency. If this field is set to *true*, the UE assumes SFN and frame boundary alignment across cells on the neighbor frequency as specified in TS 38.133 [14].

dl-CarrierFreq

This field indicates center frequency of the SS block of the neighbour cells, where the frequency corresponds to a GSCN value as specified in TS 38.101-1 [15].

frequencyBandList

Indicates the list of frequency bands for which the NR cell reselection parameters apply.

highSpeedMeasInterFreq

If the field is set to *true* and UE supports high speed inter-frequency IDLE/INACTIVE measurements, the UE shall apply the enhanced inter-frequency RRM requirements on the inter-frequency carrier to support high speed up to 500 km/h in RRC_IDLE/RRC_INACTIVE as specified in TS 38.133 [14].

interFreqAllowedCellList

List of allow-listed inter-frequency neighbouring cells, see TS 38.304 [20], clause 5.2.4.

interFreqCAG-CellList

List of inter-frequency neighbouring CAG cells (as defined in TS 38.304 [20] per PLMN.

interFreqCarrierFreqList

List of neighbouring carrier frequencies and frequency specific cell re-selection information. If *interFreqCarrierFreqList-v1610*, *interFreqCarrierFreqList-v1720* or *interFreqCarrierFreqList-v1730* are present, they shall contain the same number of entries, listed in the same order as in *interFreqCarrierFreqList* (without suffix).

interFreqExcludedCellList

List of exclude-listed inter-frequency neighbouring cells.

interFreqNeighCellList

List of inter-frequency neighbouring cells with specific cell re-selection parameters. If *interFreqNeighCellList-v1610* is present, it shall contain the same number of entries, listed in the same order as in *interFreqNeighCellList* (without suffix).

interFreaNeighHSDN-CellList

List of inter-frequency neighbouring HSDN cells as specified in TS 38.304 [20].

nrofSS-BlocksToAverage

Number of SS blocks to average for cell measurement derivation. If the field is absent, the UE uses the measurement quantity as specified in TS 38.304 [20].

p-Max

Value in dBm applicable for the neighbouring NR cells on this carrier frequency. If absent the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell or TS 38.101-2 [39] in case of an FR2 cell. In this release of the specification, if *p-Max* is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. This field is ignored by IAB-MT. The IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63].

q-OffsetCell

Parameter "Qoffsets,n" in TS 38.304 [20].

q-OffsetFreq

Parameter "Qoffset_{frequency}" in TS 38.304 [20].

a-QualMin

Parameter "Qqualmin" in TS 38.304 [20]. If the field is absent, the UE applies the (default) value of negative infinity for Qqualmin.

g-QualMinOffsetCell

Parameter "Qqualminoffsetcell" in TS 38.304 [20]. Actual value Qqualminoffsetcell = field value [dB].

SIB4 field descriptions

q-RxLevMin

Parameter "Q_{rxlevmin}" in TS 38.304 [20].

q-RxLevMinOffsetCell

Parameter "Qrxlevminoffsetcell" in TS 38.304 [20]. Actual value Qrxlevminoffsetcell = field value * 2 [dB].

q-RxLevMinOffsetCellSUL

Parameter "QrxlevminoffsetcellSUL" in TS 38.304 [20]. Actual value QrxlevminoffsetcellSUL = field value * 2 [dB].

q-RxLevMinSUL

Parameter "Q_{rxlevmin}" in TS 38.304 [20].

redCapAccessAllowed

Indicates whether RedCap UEs are allowed to access the frequency.

smtc

Measurement timing configuration for inter-frequency measurement. If this field is absent, the UE assumes that SSB periodicity is 5 ms in this frequency. If the field is broadcast by an NTN cell, the offset (derived from parameter periodicityAndOffset) is based on the assumption that service link propagation delay difference between the serving cell and neighbour cells equals to 0 ms, and UE can adjust the actual offset based on the actual propagation delay difference.

smtc2-LP

Measurement timing configuration for inter-frequency neighbour cells with a Long Periodicity (LP) indicated by periodicity in *smtc2-LP*. The timing offset and duration are equal to the offset and duration indicated in *smtc* in *InterFreqCarrierFreqInfo*. The periodicity in *smtc2-LP* can only be set to a value strictly larger than the periodicity in *smtc* in *InterFreqCarrierFreqInfo* (e.g. if *smtc* indicates sf20 the Long Periodicity can only be set to sf40, sf80 or sf160, if *smtc* indicates sf160, *smtc2-LP* cannot be configured). The *pci-List*, if present, includes the physical cell identities of the inter-frequency neighbour cells with Long Periodicity. If *smtc2-LP* is absent, the UE assumes that there are no inter-frequency neighbour cells with a Long Periodicity.

smtc4list

Measurement timing configuration list for NTN deployments, see clause 5.5.2.10. The offset of each SSB-MTC4 in *smtc4list* is based on the assumption that service link propagation delay difference between the serving cell and neighbour cells equals to 0 ms, and UE can adjust the actual *offset* based on the actual propagation delay difference. For a UE that supports less SMTCs than what is included in this list, it is up to the UE to select which SMTCs to consider.

ssb-PositionQCL

Indicates the QCL relation between SS/PBCH blocks for a specific neighbor cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the common value signalled by ssb-PositionQCL-Common in SIB4 for the indicated cell.

ssb-PositionQCL-Common

Indicates the QCL relation between SS/PBCH blocks for inter-frequency neighbor cells as specified in TS 38.213 [13], clause 4.1.

ssb-ToMeasure

The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]). When the field is absent the UE measures on all SS-blocks.

ssbSubcarrierSpacing

Subcarrier spacing of SSB.

Only the following values are applicable depending on the used frequency:

FR1: 15 or 30 kHz FR2-1: 120 or 240 kHz FR2-2: 120, 480, or 960 kHz

threshX-HighP

Parameter "Threshx, HighP" in TS 38.304 [20].

threshX-HighQ

Parameter "Thresh_{X, HighQ}" in TS 38.304 [20].

threshX-LowP

Parameter "Thresh_{X, LowP}" in TS 38.304 [20].

threshX-LowQ

Parameter "Thresh_{X, LowQ}" in TS 38.304 [20].

SIB4 field descriptions
t-ReselectionNR
Parameter "Treselection _{NR} " in TS 38.304 [20].
t-ReselectionNR-SF
Parameter "Speed dependent ScalingFactor for Treselection _{NR} " in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20].

Conditional Presence	Explanation
Mandatory	The field is mandatory present in SIB4.
RSRQ	The field is mandatory present if <i>threshServingLowQ</i> is present in <i>SIB2</i> ; otherwise it is absent.
SharedSpectrum	This field is mandatory present if this inter-frequency operates with shared spectrum channel access. Otherwise, it is absent, Need R.
SharedSpectrum2	The field is optional present, Need R, if this inter-frequency or neighbor cell operates with shared spectrum channel access. Otherwise, it is absent, Need R.

- SIB5

SIB5 contains information relevant only for inter-RAT cell re-selection i.e. information about E-UTRA frequencies and E-UTRAs neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency.

SIB5 information element

```
-- ASN1START
-- TAG-SIB5-START
SIB5 ::=
                                    SEQUENCE {
                                        CarrierFreqListEUTRA
    carrierFreqListEUTRA
                                                                                     OPTIONAL,
                                                                                                     -- Need R
    t-ReselectionEUTRA
                                        T-Reselection,
    t-ReselectionEUTRA-SF
                                        SpeedStateScaleFactors
                                                                                     OPTIONAL,
                                                                                                     -- Need S
    lateNonCriticalExtension
                                        OCTET STRING
                                                                                     OPTIONAL,
    [ [
    carrierFreqListEUTRA-v1610
                                    CarrierFreqListEUTRA-v1610
                                                                                     OPTIONAL
                                                                                                     -- Need R
    ]],
    carrierFreqListEUTRA-v1700
                                    CarrierFreqListEUTRA-v1700
                                                                                     OPTIONAL,
                                                                                                     -- Need R
    idleModeMeasVoiceFallback-r17
                                    ENUMERATED{true}
                                                                                     OPTIONAL
                                                                                                     -- Need R
    11
CarrierFreqListEUTRA ::=
                                    SEQUENCE (SIZE (1..maxEUTRA-Carrier)) OF CarrierFreqEUTRA
CarrierFreqListEUTRA-v1610 ::=
                                    SEQUENCE (SIZE (1..maxEUTRA-Carrier)) OF CarrierFreqEUTRA-v1610
CarrierFreqListEUTRA-v1700 ::=
                                    SEQUENCE (SIZE (1..maxEUTRA-Carrier)) OF CarrierFreqEUTRA-v1700
CarrierFreqEUTRA ::=
                                    SEOUENCE {
    carrierFreq
                                        ARFCN-ValueEUTRA,
```

```
eutra-multiBandInfoList
                                        EUTRA-MultiBandInfoList
                                                                                      OPTIONAL,
                                                                                                      -- Need R
    eutra-FreqNeighCellList
                                        EUTRA-FreqNeighCellList
                                                                                     OPTIONAL,
                                                                                                      -- Need R
    eutra-ExcludedCellList
                                        EUTRA-FregExcludedCellList
                                                                                      OPTIONAL.
                                                                                                      -- Need R
                                        EUTRA-AllowedMeasBandwidth,
    allowedMeasBandwidth
    presenceAntennaPort1
                                        EUTRA-PresenceAntennaPort1.
    cellReselectionPriority
                                        CellReselectionPriority
                                                                                                      -- Need R
                                                                                      OPTIONAL,
    cellReselectionSubPriority
                                        CellReselectionSubPriority
                                                                                      OPTIONAL,
                                                                                                      -- Need R
    threshX-High
                                        ReselectionThreshold,
    threshX-Low
                                        ReselectionThreshold,
    q-RxLevMin
                                        INTEGER (-70..-22),
    q-QualMin
                                        INTEGER (-34..-3),
    p-MaxEUTRA
                                        INTEGER (-30..33),
                                        SEQUENCE {
    threshX-Q
        threshX-HighQ
                                            ReselectionThresholdO,
        threshX-LowO
                                            ReselectionThresholdO
                                                                                      OPTIONAL
                                                                                                      -- Cond RSRO
CarrierFregEUTRA-v1610 ::= SEQUENCE
    highSpeedEUTRACarrier-r16
                                     ENUMERATED {true}
                                                                                      OPTIONAL
                                                                                                      -- Need R
CarrierFreqEUTRA-v1700 ::=
                                     SEQUENCE {
    eutra-FreqNeighHSDN-CellList-r17
                                        EUTRA-FreqNeighHSDN-CellList-r17
                                                                                      OPTIONAL
                                                                                                      -- Need R
EUTRA-FreqNeighHSDN-CellList-r17 ::= SEOUENCE (SIZE (1..maxCellEUTRA)) OF EUTRA-PhysCellIdRange
EUTRA-FreqExcludedCellList ::=
                                    SEQUENCE (SIZE (1..maxEUTRA-CellExcluded)) OF EUTRA-PhysCellIdRange
EUTRA-FreqNeighCellList ::=
                                    SEQUENCE (SIZE (1..maxCellEUTRA)) OF EUTRA-FreqNeighCellInfo
EUTRA-FreqNeighCellInfo ::=
                                     SEQUENCE {
    physCellId
                                        EUTRA-PhysCellId,
                                        EUTRA-O-OffsetRange,
    dummy
                                        INTEGER (1..8)
    q-RxLevMinOffsetCell
                                                                                      OPTIONAL.
                                                                                                      -- Need R
    q-QualMinOffsetCell
                                        INTEGER (1..8)
                                                                                      OPTIONAL
                                                                                                      -- Need R
-- TAG-SIB5-STOP
-- ASN1STOP
```

SIB5 field descriptions

carrierFreqListEUTRA

List of carrier frequencies of E-UTRA. If the *carrierFreqListEUTRA-v1610/ carrierFreqListEUTRA-v1700* is present, it shall contain the same number of entries, listed in the same order as in the *carrierFreqListEUTRA* (without suffix).

dummy

This field is not used in the specification. If received it shall be ignored by the UE.

eutra-ExcludedCellList

List of exclude-listed E-UTRA neighbouring cells.

eutra-FregNeighHSDN-CellList

List of neighbouring EUTRA HSDN cells as specified in TS 36.304 [27].

eutra-multiBandInfoList

Indicates the list of frequency bands in addition to the band represented by *carrierFreq* for which cell reselection parameters are common, and a list of *additionalPmax* and *additionalSpectrumEmission* values, as defined in TS 36.101 [22], table 6.2.4-1, for the frequency bands in *eutra-multiBandInfoList*

highSpeedEUTRACarrier

If the field is present, the UE shall apply the enhanced NR-EUTRA inter-RAT measurement requirements to support high speed up to 500 km/h as specified in TS 38.133 [14] to the E-UTRA carrier.

idleModeMeasVoiceFallback

Indicates whether E-UTRA idle/inactive measurements and reporting for EPS fallback can be used.

p-MaxEUTRA

The maximum allowed transmission power in dBm on the (uplink) carrier frequency, see TS 36.304 [27].

q-QualMin

Parameter "Qqualmin" in TS 36.304 [27]. Actual value Qqualmin = field value [dB].

g-QualMinOffsetCell

Parameter "Qqualminoffsetcell" in TS 36.304 [27]. Actual value Qqualminoffsetcell = field value [dB].

a-RxLevMin

Parameter "Q_{rxlevmin}" in TS 36.304 [27]. Actual value Q_{rxlevmin} = field value * 2 [dBm].

a-RxLevMinOffsetCell

Parameter "Qrxlevminoffsetcell" in TS 36.304 [27]. Actual value Qrxlevminoffsetcell = field value * 2 [dB].

t-ReselectionEUTRA

Parameter "Treselection_{EUTRA}" in TS 38.304 [20].

threshX-High

Parameter "Thresh_{X, HighP}" in TS 38.304 [20].

threshX-HighQ

Parameter "Threshx, HighQ" in TS 38.304 [20].

threshX-Low

Parameter "Thresh_{X, LowP}" in TS 38.304 [20].

threshX-LowQ

Parameter "Threshx, LowQ" in TS 38.304 [20].

t-ReselectionEUTRA-SF

Parameter "Speed dependent ScalingFactor for Treselection_{EUTRA}" in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20].

Conditional Presence	Explanation	Explanation
RSRQ	The field is mandatory present if the <i>threshServingLowQ</i> is present in <i>SIB2</i> ; otherwise it is absent.	Id is mandatory present if the threshServingLowQ is present in SIB2; otherwise it is absent.

- SIB6

SIB6 contains an ETWS primary notification.

SIB6 information element

```
-- ASN1START
-- TAG-SIB6-START

SIB6 ::= SEQUENCE {
    messageIdentifier BIT STRING (SIZE (16)),
    serialNumber BIT STRING (SIZE (16)),
    warningType OCTET STRING (SIZE (2)),
    lateNonCriticalExtension OCTET STRING
    ...
}

-- TAG-SIB6-STOP
-- ASN1STOP
```

SIB6 field descriptions

messageldentifier

Identifies the source and type of ETWS notification.

serialNumber

Identifies variations of an ETWS notification.

warningType

Identifies the warning type of the ETWS primary notification and provides information on emergency user alert and UE popup.

- SIB7

SIB7 contains an ETWS secondary notification.

SIB7 information element

```
-- ASN1START
-- TAG-SIB7-START
SIB7 ::=
                                   SEQUENCE {
   messageIdentifier
                                      BIT STRING (SIZE (16)),
    serialNumber
                                      BIT STRING (SIZE (16)),
    warningMessageSegmentType
                                      ENUMERATED {notLastSegment, lastSegment},
    warningMessageSegmentNumber
                                      INTEGER (0..63),
    warningMessageSegment
                                      OCTET STRING,
    dataCodingScheme
                                      OCTET STRING (SIZE (1))
                                                                                 OPTIONAL,
                                                                                            -- Cond Segment1
   lateNonCriticalExtension
                                      OCTET STRING
                                                                                 OPTIONAL,
```

```
-- TAG-SIB7-STOP
-- ASN1STOP
```

SIB7 field descriptions

dataCodingScheme

Identifies the alphabet/coding and the language applied variations of an ETWS notification.

messageldentifier

Identifies the source and type of ETWS notification.

serialNumber

Identifies variations of an ETWS notification.

warningMessageSegment

Carries a segment of the Warning Message Contents IE.

warningMessageSegmentNumber

Segment number of the ETWS warning message segment contained in the SIB. A segment number of zero corresponds to the first segment, A segment number of one corresponds to the second segment, and so on.

warningMessageSegmentType

Indicates whether the included ETWS warning message segment is the last segment or not.

Conditional Presence	Explanation
Segment1	The field is mandatory present in the first segment of SIB7, otherwise it is absent.

– SIB8

SIB8 contains a CMAS notification.

SIB8 information element

```
-- ASN1START
-- TAG-SIB8-START
SIB8 ::=
                              SEQUENCE {
   3 ::=
messageIdentifier
                            BIT STRING (SIZE (16)),
   serialNumber
                                 BIT STRING (SIZE (16)),
   warningMessageSegmentType ENUMERATED {notLastSegment, lastSegment},
   warningMessageSegmentNumber INTEGER (0..63),
    warningMessageSegment
                                 OCTET STRING,
   dataCodingScheme
                                 OCTET STRING (SIZE (1))
                                                                               OPTIONAL, -- Cond Segment1
    warningAreaCoordinatesSegment OCTET STRING
                                                                               OPTIONAL,
                                                                                          -- Need R
   lateNonCriticalExtension
                                 OCTET STRING
                                                                               OPTIONAL,
-- TAG-SIB8-STOP
-- ASN1STOP
```

SIB8 field descriptions

dataCodingScheme

Identifies the alphabet/coding and the language applied variations of a CMAS notification.

messageldentifier

Identifies the source and type of CMAS notification.

serialNumber

Identifies variations of a CMAS notification.

warningAreaCoordinatesSegment

If present, carries a segment, with one or more octets, of the geographical area where the CMAS warning message is valid as defined in [28]. The first octet of the first warningAreaCoordinatesSegment is equivalent to the first octet of Warning Area Coordinates IE defined in and encoded according to TS 23.041 [29] and so on.

warningMessageSegment

Carries a segment, with one or more octets, of the *Warning Message Contents* IE defined in TS 38.413 [42]. The first octet of the *Warning Message Contents* IE is equivalent to the first octet of the *CB data* IE defined in and encoded according to TS 23.041 [29], clause 9.4.2.2.5, and so on.

warningMessageSegmentNumber

Segment number of the CMAS warning message segment contained in the SIB. A segment number of zero corresponds to the first segment, one corresponds to the second segment, and so on. If warning area coordinates are provided for the warning message, then this field applies to both warning message segment and warning area coordinates segment.

warningMessageSegmentType

Indicates whether the included CMAS warning message segment is the last segment or not. If warning area coordinates are provided for the warning message, then this field applies to both warning message segment and warning area coordinates segment.

Conditional Presence	Explanation
Segment1	The field is mandatory present in the first segment of <i>SIB8</i> , otherwise it is absent.

- SIB9

SIB9 contains information related to GPS time and Coordinated Universal Time (UTC). The UE may use the parameters provided in this system information block to obtain the UTC, the GPS and the local time.

NOTE: The UE may use the time information for numerous purposes, possibly involving upper layers e.g. to assist GPS initialisation, to synchronise the UE clock.

SIB9 information element

```
-- ASN1START
-- TAG-SIB9-START
SIB9 ::=
                                  SEOUENCE {
    timeInfo
                                      SEQUENCE {
       timeInfoUTC
                                          INTEGER (0..549755813887),
       dayLightSavingTime
                                          BIT STRING (SIZE (2))
                                                                                 OPTIONAL, -- Need R
       leapSeconds
                                                                                 OPTIONAL, -- Need R
                                          INTEGER (-127..128)
       localTimeOffset
                                          INTEGER (-63..64)
                                                                                 OPTIONAL
                                                                                            -- Need R
                                                                                 OPTIONAL, -- Need R
```

```
lateNonCriticalExtension OCTET STRING OPTIONAL,
...,
[[
referenceTimeInfo-r16 ReferenceTimeInfo-r16 OPTIONAL -- Need R
]]
}
-- TAG-SIB9-STOP
-- ASNISTOP
```

SIB9 field descriptions

dayLightSavingTime

Indicates if and how daylight-saving time (DST) is applied to obtain the local time. The semantics are the same as the semantics of the *Daylight Saving Time* IE in TS 24.501 [23] and TS 24.008 [38]. The first/leftmost bit of the bit string contains the b2 of octet 3 and the second bit of the bit string contains b1 of octet 3 in the value part of the *Daylight Saving Time* IE in TS 24.008 [38].

leapSeconds

Number of leap seconds offset between GPS Time and UTC. UTC and GPS time are related i.e. GPS time -leapSeconds = UTC time.

localTimeOffset

Offset between UTC and local time in units of 15 minutes. Actual value = field value * 15 minutes. Local time of the day is calculated as UTC time + localTimeOffset.

timeInfoUTC

Coordinated Universal Time corresponding to the SFN boundary at or immediately after the ending boundary of the SI-window in which SIB9 is transmitted. The field counts the number of UTC seconds in 10 ms units since 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Sunday, December 31, 1899 and Monday, January 1, 1900). See NOTE 1. This field is excluded when determining changes in system information, i.e. changes of *timeInfoUTC* should neither result in system information change notifications nor in a modification of *valueTag* in *SIB1*.

NOTE 1: The UE may use this field together with the *leapSeconds* field to obtain GPS time as follows: GPS Time (in seconds) = timeInfoUTC (in seconds) - 2,524,953,600 (seconds) + leapSeconds, where 2,524,953,600 is the number of seconds between 00:00:00 on Gregorian calendar date 1 January, 1900 and 00:00:00 on Gregorian calendar date 6 January, 1980 (start of GPS time).

- SIB10

SIB10 contains the HRNNs of the NPNs listed in SIB1.

SIB10 information element

```
-- ASN1START
-- TAG-SIB10-START

SIB10-r16 ::= SEQUENCE {
   hrnn-List-r16 HRNN-List-r16 OPTIONAL, -- Need R
   lateNonCriticalExtension OCTET STRING OPTIONAL,
   ...
}

HRNN-List-r16 ::= SEQUENCE (SIZE (1..maxNPN-r16)) OF HRNN-r16

HRNN-r16 ::= SEQUENCE {
```

```
hrnn-r16 OCTET STRING (SIZE(1.. maxHRNN-Len-r16)) OPTIONAL -- Need R

-- TAG-SIB10-STOP
-- ASN1STOP
```

SIB10 field descriptions

HRNN-List

The same amount of HRNN (see TS 23.003 [21]) elements as the number of NPNs in SIB 1 are included. The n-th entry of *HRNN-List* contains the human readable network name of the n-th NPN of SIB1. The *hrnn* in the corresponding entry in *HRNN-List* is absent if there is no HRNN associated with the given NPN.

– SIB11

SIB11 contains information related to idle/inactive measurements.

SIB11 information element

```
-- ASN1START
-- TAG-SIB11-START

SIB11-r16 ::= SEQUENCE {
   measIdleConfigSIB-r16 MeasIdleConfigSIB-r16 OPTIONAL, -- Need S lateNonCriticalExtension OCTET STRING OPTIONAL,
   ...
}

-- TAG-SIB11-STOP
-- ASN1STOP
```

SIB11 field descriptions

measIdleConfigSIB

Indicates measurement configuration to be stored and used by the UE while in RRC_IDLE or RRC_INACTIVE.

– SIB12

SIB12 contains NR sidelink communication/discovery configuration.

SIB12 information element

```
-- ASN1START
-- TAG-SIB12-START

SIB12-r16 ::= SEQUENCE {
   segmentNumber-r16 INTEGER (0..63),
```

```
segmentType-r16
                                  ENUMERATED {notLastSegment, lastSegment},
    segmentContainer-r16
                                  OCTET STRING
SIB12-IEs-r16 ::=
                              SEOUENCE {
    sl-ConfigCommonNR-r16
                                  SL-ConfigCommonNR-r16,
    lateNonCriticalExtension
                                  OCTET STRING
                                                                 OPTIONAL.
    11
    sl-DRX-ConfigCommonGC-BC-r17
                                         SL-DRX-ConfigGC-BC-r17
                                                                                                                 OPTIONAL.
                                                                                                                              -- Need R
    sl-DiscConfigCommon-r17
                                         SL-DiscConfigCommon-r17
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
    sl-L2U2N-Relay-r17
                                         ENUMERATED {enabled}
                                                                                                                              -- Need R
                                                                                                                 OPTIONAL,
    sl-NonRelayDiscovery-r17
                                         ENUMERATED {enabled}
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
    sl-L3U2N-RelayDiscovery-r17
                                         ENUMERATED {enabled}
                                                                                                                 OPTIONAL.
                                                                                                                              -- Need R
    sl-TimersAndConstantsRemoteUE-r17
                                         UE-TimersAndConstantsRemoteUE-r17
                                                                                                                 OPTIONAL
                                                                                                                              -- Need R
    11
SL-ConfigCommonNR-r16 ::=
                                 SEOUENCE {
    sl-FreqInfoList-r16
                                         SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfigCommon-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
    sl-UE-SelectedConfig-r16
                                         SL-UE-SelectedConfig-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
    sl-NR-AnchorCarrierFreqList-r16
                                         SL-NR-AnchorCarrierFreqList-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
    sl-EUTRA-AnchorCarrierFreqList-r16
                                         SL-EUTRA-AnchorCarrierFreqList-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
    sl-RadioBearerConfigList-r16
                                         SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SL-RadioBearerConfig-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
    sl-RLC-BearerConfigList-r16
                                         SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfig-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
    sl-MeasConfigCommon-r16
                                         SL-MeasConfigCommon-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
    sl-CSI-Acquisition-r16
                                         ENUMERATED {enabled}
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
                                         INTEGER (1..1000)
    sl-OffsetDFN-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
    t.400-r16
                                         ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000} OPTIONAL,
                                                                                                                              -- Need R
    sl-MaxNumConsecutiveDTX-r16
                                         ENUMERATED {n1, n2, n3, n4, n6, n8, n16, n32}
                                                                                                                              -- Need R
                                                                                                                 OPTIONAL,
    sl-SSB-PriorityNR-r16
                                         INTEGER (1..8)
                                                                                                                 OPTIONAL
                                                                                                                              -- Need R
SL-NR-AnchorCarrierFreqList-r16 ::= SEQUENCE (SIZE (1..maxFreqSL-NR-r16)) OF ARFCN-ValueNR
SL-EUTRA-AnchorCarrierFreqList-r16 ::= SEQUENCE (SIZE (1..maxFreqSL-EUTRA-r16)) OF ARFCN-ValueEUTRA
SL-DiscConfigCommon-r17 ::= SEQUENCE {
    sl-RelayUE-ConfigCommon-r17 SL-RelayUE-Config-r17,
    sl-RemoteUE-ConfigCommon-r17 SL-RemoteUE-Config-r17
-- TAG-SIB12-STOP
-- ASN1STOP
```

SIB12 field descriptions

segmentContainer

This field includes a segment of the encoded *SIB12-IEs*. The size of the included segment in this container should be small enough that the SIB message size is less than or equal to the maximum size of a NR SI, i.e. 2976 bits when SIB12 is broadcast.

segmentNumber

This field identifies the sequence number of a segment of SIB12-IEs. A segment number of zero corresponds to the first segment, A segment number of one corresponds to the second segment, and so on.

segmentType

This field indicates whether the included segment is the last segment or not.

sI-CSI-Acquisition

This field indicates whether CSI reporting is enabled in sidelink unicast. If not set, SL CSI reporting is disabled.

sI-DRX-ConfigCommonGC-BC

This field indicates the sidelink DRX configuration for groupcast and broadcast communication, as specified in TS 38.321 [3]. This field, if present, also indicates the gNB is capable of sidelink DRX.

sI-EUTRA-AnchorCarrierFreqList

This field indicates the EUTRA anchor carrier frequency list, which can provide the NR sidelink communication configurations.

sl-FreqInfoList

This field indicates the NR sidelink communication/discovery configuration on some carrier frequency (ies). In this release, only one entry can be configured in the list.

sI-L2U2N-Relay

This field indicates the support of NR sidelink Layer-2 relay.

sI-L3U2N-RelayDiscovery

This field indicates the support of L3 U2N relay AS-layer capability, i.e. NR sidelink relay discovery.

sI-MaxNumConsecutiveDTX

This field indicates the maximum number of consecutive HARQ DTX before triggering sidelink RLF. Value n1 corresponds to 1, value n2 corresponds to 2, and so on.

sI-MeasConfigCommon

This field indicates the measurement configurations (e.g. RSRP) for NR sidelink communication.

sl-NonRelayDiscovery

This field indicates the support of NR sidelink non-relay discovery.

sI-NR-AnchorCarrierFreqList

This field indicates the NR anchor carrier frequency list, which can provide the NR sidelink communication/discovery configurations.

sI-OffsetDFN

Indicates the timing offset for the UE to determine DFN timing when GNSS is used for timing reference. Value 1 corresponds to 0.001 milliseconds, value 2 corresponds to 0.002 milliseconds, and so on.

sl-RadioBearerConfigList

This field indicates one or multiple sidelink radio bearer configurations.

sI-RLC-BearerConfigList

This field indicates one or multiple sidelink RLC bearer configurations.

sI-SSB-PriorityNR

This field indicates the priority of NR sidelink SSB transmission and reception.

t400

Indicates the value for timer T400 as described in clause 7.1. Value ms100 corresponds to 100 ms, value ms200 corresponds to 200 ms and so on.

- SIB13

SIB13 contains configurations of V2X sidelink communication defined in TS 36.331 [10].

SIB13 information element

```
-- ASN1START
-- TAG-SIB13-START

SIB13-r16 ::= SEQUENCE {
   s1-V2X-ConfigCommon-r16 OCTET STRING,
   dummy OCTET STRING,
   tdd-Config-r16 OCTET STRING,
   lateNonCriticalExtension OCTET STRING
   ...
}

-- TAG-SIB13-STOP
-- ASN1STOP
```

SIB13 field descriptions

dummy

This field is not used in the specification and the UE ignores the received value.

sI-V2X-ConfigCommon

This field includes the E-UTRA SystemInformationBlockType21 message as specified in TS 36.331 [10].

tdd-Config

This field includes the tdd-Config in E-UTRA SystemInformationBlockType1 message as specified in TS 36.331 [10].

- SIB14

SIB14 contains configurations of V2X sidelink communication defined in TS 36.331 [10], which can be used jointly with that included in SIB13.

SIB14 information element

```
-- ASN1START
-- TAG-SIB14-START

SIB14-r16 ::= SEQUENCE {
   sl-V2X-ConfigCommonExt-r16 OCTET STRING,
   lateNonCriticalExtension OCTET STRING
   ...
}

-- TAG-SIB14-STOP
-- ASN1STOP
```

SIB14 field descriptions

sI-V2X-ConfigCommonExt

This field includes the E-UTRA SystemInformationBlockType26 message as specified in TS 36.331 [10].

SIB15

SIB15 contains configurations of disaster roaming information.

SIB15 information element

```
-- ASN1START
-- TAG-SIB15-START
SIB15-r17 ::=
                                   SEOUENCE {
   commonPLMNsWithDisasterCondition-r17 SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity
                                                                                                   OPTIONAL, -- Need R
   applicableDisasterInfoList-r17 SEQUENCE (SIZE (1..maxPLMN)) OF ApplicableDisasterInfo-r17
                                                                                                  OPTIONAL, -- Need R
   lateNonCriticalExtension
                                       OCTET STRING
                                                                                                   OPTIONAL,
ApplicableDisasterInfo-r17 ::= CHOICE {
   noDisasterRoaming-r17
                                  NULL.
   disasterRelatedIndication-r17
                                  NULL,
   commonPLMNs-r17
                                  NULL,
   dedicatedPLMNs-r17
                                  SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity
-- TAG-SIB15-STOP
-- ASN1STOP
```

SIB15 field descriptions

commonPLMNsWithDisasterCondition

A list of PLMN(s) for which disaster condition applies and that disaster inbound roaming is accepted, which can be commonly applicable to the PLMNs sharing the cell. applicableDisasterInfoList

A list indicating the applicable disaster roaming information for the networks indicated in plmn-IdentityInfoList and npn-IdentityInfoList-r16. The network indicates in this list one entry for each entry of plmn-IdentityInfoList, followed by one entry for each entry of npn-IdentityInfoList-r16, meaning that this list will have as many entries as the number of entries of the combination of plmn-IdentityInfoList and npn-IdentityInfoList-r16. The first entry in this list indicates the disaster roaming information applicable for the network(s) in the first entry of plmn-IdentityInfoList/npn-IdentityInfoListr16, the second entry in this list indicates the disaster roaming information applicable for the network(s) in the second entry of plmn-IdentityInfoList/npn-IdentityInfoListr16, and so on. Each entry in this list can either be having the value noDisasterRoaming, disasterRelatedIndication, commonPLMNs, or dedicatedPLMNs. If an entry in this list takes the value noDisasterRoaming, disaster inbound roaming is not allowed in this network(s). If an entry in this list takes the value disaster related indication, the meaning of this field for this network(s) is as specified for "disaster related indication" in TS 23.122 [74], clause 4.4.3.1.1. If an entry in this list takes the value commonPLMNs, the PLMN(s) with disaster conditions indicated in the field commonPLMNsWithDisasterCondition apply for this network(s). If an entry in this list contains the value dedicatedPLMNs, the listed PLMN(s) are the PLMN(s) with disaster conditions that the network(s) corresponding to this entry accepts disaster inbound roamers from. For SNPNs, the network indicates the value noDisasterRoaming.

SIB16

SIB16 contains configurations of slice-based cell reselection information.

SIB16 information element

```
-- ASN1START
-- TAG-SIB16-START

SIB16-r17 ::= SEQUENCE {
   freqPriorityListSlicing-r17 OPTIONAL, -- Need R
   lateNonCriticalExtension OCTET STRING OPTIONAL,
   ...
}

-- TAG-SIB16-STOP
-- ASN1STOP
```

SIB16 field descriptions

freqPriorityListSlicing

This field indicates cell reselection priorities for slicing.

- SIB17

SIB17 contains configurations of TRS resources for idle/inactive UEs.

SIB17 information element

```
-- ASN1START
-- TAG-SIB17-START
SIB17-r17 ::=
                           SEQUENCE {
    segmentNumber-r17
                               INTEGER (0..63),
                               ENUMERATED {notLastSegment, lastSegment},
    segmentType-r17
    segmentContainer-r17
                               OCTET STRING
SIB17-IEs-r17 ::=
                            SEQUENCE {
    trs-ResourceSetConfig-r17
                                SEQUENCE (SIZE (1..maxNrofTRS-ResourceSets-r17)) OF TRS-ResourceSet-r17,
    validityDuration-r17
                                ENUMERATED {t1, t2, t4, t8, t16, t32, t64, t128, t256, t512, infinity, spare5, spare4, spare3, spare2,
                                            spare1}
                                                                                                               OPTIONAL, -- Need S
   lateNonCriticalExtension
                                OCTET STRING
                                                                                                               OPTIONAL,
TRS-ResourceSet-r17 ::=
                                       SEQUENCE {
    powerControlOffsetSS-r17
                                           ENUMERATED {db-3, db0, db3, db6},
    scramblingID-Info-r17
                                           CHOICE {
        scramblingIDforCommon-r17
                                              ScramblingId,
       scramblingIDperResourceListWith2-r17 SEQUENCE (SIZE (2)) OF ScramblingId,
       scramblingIDperResourceListWith4-r17 SEQUENCE (SIZE (4)) OF ScramblingId,
    },
```

```
firstOFDMSymbolInTimeDomain-r17
                                               INTEGER (0..9),
    startingRB-r17
                                               INTEGER (0..maxNrofPhysicalResourceBlocks-1),
                                               INTEGER (24..maxNrofPhysicalResourceBlocksPlus1).
    nrofRBs-r17
    ssb-Index-r17
                                               SSB-Index.
   periodicityAndOffset-r17
                                               CHOICE {
       slots10
                                                   INTEGER (0..9),
       slots20
                                                   INTEGER (0..19),
       slots40
                                                   INTEGER (0..39),
       slots80
                                                   INTEGER (0..79)
    frequencyDomainAllocation-r17
                                               BIT STRING (SIZE (4)),
    indBitID-r17
                                               INTEGER (0..5),
    nrofResources-r17
                                               ENUMERATED {n2, n4}
-- TAG-SIB17-STOP
-- ASN1STOP
```

SIB17 field descriptions

segmentContainer

This field includes a segment of the encoded SIB17-IEs. The size of the included segment in this container should be small enough that the SIB message size is less than or equal to the maximum size of a NR SI, i.e. 2976 bits when SIB17 is broadcast.

segmentNumber

This field identifies the sequence number of a segment of SIB17-IEs. A segment number of zero corresponds to the first segment, a segment number of one corresponds to the second segment, and so on.

segmentType

This field indicates whether the included segment is the last segment or not.

trs-ResourceSetConfig

RS configuration of TRS occasion(s) for idle/inactive UE(s), in terms of a list of N>=1 NZP TRS resource set(s). The maximum number of TRS resource sets configured by higher layer is 64. If a TRS resource is configured, the L1 based availability indication is always enabled based on that configuration. A UE which acquired *SIB17* with a TRS configuration but did not yet receive an associated L1-based availability indication considers the configured TRS as unavailable. If SIB scheduling indicates that *SIB17* has changed, the UE considers its configured TRS(s) as unavailable until it receives the associated L1-based availability indication(s).

validityDuration

The valid time duration for L1 availability indication, time unit is one default paging cycle. When the field is absent, UE assumes a default time duration to be 2 default paging cycles. The field is only valid while the UE has a valid SIB17.

TRS-ResourceSet field descriptions

firstOFDMSymbolInTimeDomain

The index of the first OFDM symbol in the PRB used for TRS in a slot. The field indicates the first symbol in a slot for the first TRS resource within the slot, and the symbol for the second TRS resource in the same slot can be derived implicitly with symbol index as *firstOFDMSymbolInTimeDomain*+4.

frequencyDomainAllocation

Indicates the offset of the first RE to RE#0 in a RB in row1.

indBitID

The index of the associated bit in TRS availability indication field in DCI. Each TRS resource set is configured with an ID i for the association with (i+1)-th indication bit in TRS availability indication field in DCI.

nrofRBs

Number of PRBs across which corresponding TRS resource spans.

nrofResources

The number of TRS resources for a TRS resource set.

periodicityAndOffset

The periodicity and slot offset (slot) for periodic TRS. It is used to determine the location of the first slot of TRS resource set. The periodicity value *slots10* corresponds to 10 slots, value *slots20* corresponds to 20 slots, and so on.

powerControlOffsetSS

Power offset (dB) of NZP CSI-RS RE to SSS RE.

scramblingID-Info

One or more scrambling IDs are configured for a TRS resource set. If a common scrambling ID is configured, it applies to all the TRS resources within the TRS resource set. Otherwise, each TRS resource within the TRS resource set is provided with a scrambling ID. If the number of TRS resource set for the TRS resource set is 2, scramblingIDperResourceListWith2-r17 is configured, while scramblingIDperResourceListWith4-r17 is configured for the case that the number of TRS resources for the TRS resource set is 4.

ssb-Index

The index of reference SSB with which quasi-collocation information is provided as specified in TS 38.214 [19] clause 5.1.5.

startingRB

The PRB index where corresponding TRS resource starts in relation to common resource block #0 (CRB#0) on the common resource block grid.

- SIB18

SIB18 contains Group IDs for Network selection (GINs) to support access using credentials from a Credentials Holder or to support UE onboarding.

SIB18 information element

```
-- ASN1START
-- TAG-SIB18-START

SIB18-r17 ::= SEQUENCE {
    gin-ElementList-r17 SEQUENCE (SIZE (1..maxGIN-r17)) OF GIN-Element-r17 OPTIONAL, -- Need R
    gins-PerSNPN-List-r17 SEQUENCE (SIZE (1..maxNPN-r16)) OF GINs-PerSNPN-r17 OPTIONAL, -- Need S
    lateNonCriticalExtension OCTET STRING OPTIONAL,
}

GIN-Element-r17 ::= SEQUENCE {
    plmn-Identity-r17 PLMN-Identity,
```

SIB18 field descriptions

gin-ElementList

The *gin-ElementList* contains one or more GIN elements. Each GIN element contains either one GIN, which is identified by a PLMN ID and a NID, or multiple GINs that share the same PLMN ID. The total number of GINs indicated does not exceed maxGIN-r17. The GIN index *m* is defined as d1+d2+...+d(n-1)+i for the GIN included in the *n*-th entry of the *gin-ElementList* and the *i*-th entry of its corresponding *GIN-Element*, where *d(k)* is the number of GIN index values used in the *k*-th *gin-ElementList* entry.

gins-PerSNPN-List

Indicates the supported GINs for each SNPN. The network includes the same number of entries as the number of SNPNs in *snpn-AccessInfoList* in provided in SIB1, and the n-th entry in this list corresponds to the n-th SNPN listed in *snpn-AccessInfoList* provided in SIB1. The network configures this field only if the cell broadcasts more than one SNPN in *SIB1*. If this field is absent, as in case of a single SNPN broadcasted in *SIB1*, the UE shall associate all GINs in *qin-ElementList* to that SNPN.

GINs-PerSNPN field descriptions

supportedGINs

Indicates the GINs which are supported by the given SNPN. The first/leftmost bit corresponds to the GIN with GIN index 1, the second bit corresponds to the GIN with GIN index 2 and so on. A bit set to 1 indicates that the GIN is supported by the SNPN. If the field is not present, then the corresponding SNPN does not support any GINs.

- SIB19

SIB19 contains satellite assistance information for NTN access.

SIB19 information element

```
-- ASN1START
-- TAG-SIB19-START
SIB19-r17 ::= SEOUENCE {
    ntn-Config-r17
                                             NTN-Config-r17
                                                                                               OPTIONAL,
                                                                                                               -- Need R
    t-Service-r17
                                             INTEGER (0..549755813887)
                                                                                               OPTIONAL,
                                                                                                               -- Need R
    referenceLocation-r17
                                              ReferenceLocation-r17
                                                                                               OPTIONAL,
                                                                                                               -- Need R
    distanceThresh-r17
                                             INTEGER(0..65525)
                                                                                                               -- Need R
                                                                                               OPTIONAL,
   ntn-NeighCellConfigList-r17
                                             NTN-NeighCellConfigList-r17
                                                                                               OPTIONAL,
                                                                                                               -- Need R
   lateNonCriticalExtension
                                             OCTET STRING
                                                                                               OPTIONAL,
    ntn-NeighCellConfigListExt-v1720
                                             NTN-NeighCellConfigList-r17
                                                                                               OPTIONAL
                                                                                                               -- Need R
    11
```

```
NTN-NeighCellConfigList-r17 ::=
                                        SEQUENCE (SIZE(1..maxCellNTN-r17)) OF NTN-NeighCellConfig-r17
NTN-NeighCellConfig-r17 ::=
                                        SEOUENCE {
   ntn-Config-r17
                                            NTN-Config-r17
                                                                                            OPTIONAL.
                                                                                                           -- Need R
    carrierFreq-r17
                                            ARFCN-ValueNR
                                                                                            OPTIONAL.
                                                                                                           -- Need R
   physCellId-r17
                                            PhysCellId
                                                                                            OPTIONAL
                                                                                                           -- Need R
-- TAG-SIB19-STOP
```

SIB19 field descriptions

distanceThresh

Distance from the serving cell reference location and is used in location-based measurement initiation in RRC_IDLE and RRC_INACTIVE, as defined in TS 38.304 [20]. Each step represents 50m.

ntn-Config

-- ASN1STOP

Provides parameters needed for the UE to access NR via NTN access such as Ephemeris data, common TA parameters, k_offset, validity duration for UL sync information and epoch.

ntn-NeighCellConfigList, ntn-NeighCellConfigListExt

Provides a list of NTN neighbour cells including their ntn-Config, carrier frequency and PhysCellId. This set includes all elements of ntn-NeighCellConfigList and all elements of ntn-NeighCellConfigListExt. If ntn-Config is absent for an entry in ntn-NeighCellConfigListExt, the ntn-Config provided in the entry at the same position in ntn-NeighCellConfigList applies.

referenceLocation

Reference location of the serving cell provided via NTN quasi-Earth fixed system and is used in location-based measurement initiation in RRC_IDLE and RRC_INACTIVE, as defined in TS 38.304 [20].

t-Service

Indicates the time information on when a cell provided via NTN quasi-Earth fixed system is going to stop serving the area it is currently covering. The field indicates a time in multiples of 10 ms after 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Sunday, December 31, 1899 and Monday, January 1, 1900). The exact stop time is between the time indicated by the value of this field minus 1 and the time indicated by the value of this field.

- SIB20

SIB20 contains the information required to acquire the MCCH configuration for MBS broadcast.

SIB20 information element

```
mcch-RepetitionPeriodAndOffset-r17 MCCH-RepetitionPeriodAndOffset-r17,
   mcch-WindowStartSlot-r17
                                        INTEGER (0..79).
   mcch-WindowDuration-r17
                                         ENUMERATED {sl2, sl4, sl8, sl10, sl20, sl40,sl80, sl160}
                                                                                                      OPTIONAL. -- Need S
    mcch-ModificationPeriod-r17
                                         ENUMERATED {rf2, rf4, rf8, rf16, rf32, rf64, rf128, rf256,
                                        rf512, rf1024, r2048, rf4096, rf8192, rf16384, rf32768, rf65536}
MCCH-RepetitionPeriodAndOffset-r17 ::= CHOICE {
    rf1-r17
                                           INTEGER (0),
   rf2-r17
                                           INTEGER (0..1),
   rf4-r17
                                           INTEGER(0..3),
   rf8-r17
                                           INTEGER (0..7),
   rf16-r17
                                           INTEGER(0..15),
   rf32-r17
                                           INTEGER(0..31),
   rf64-r17
                                           INTEGER(0..63),
   rf128-r17
                                           INTEGER(0..127),
    rf256-r17
                                           INTEGER(0..255)
-- TAG-SIB20-STOP
-- ASN1STOP
```

cfr-ConfiaMCCH-MTCH

SIB20 field descriptions

Common frequency resource used for MCCH and MTCH reception. If the field is absent, the CFR for broadcast has the same location and size as CORESET0 and PDSCH configuration of MCCH is the same as PDSCH configuration provided in *initialDownlinkBWP* in *SIB1*.

mcch-WindowDuration

Indicates, starting from the slot indicated by *mcch-WindowStartSlot*, the duration in slots during which MCCH may be scheduled. Absence of this field means that MCCH is only scheduled in the slot indicated by *mcch-WindowStartSlot*. The network always configures *mcch-WindowDuration* to be shorter or equal to the length of MCCH repetition period.

mcch-ModificationPeriod

Defines periodically appearing boundaries, i.e. radio frames for which SFN mod *mcch-ModificationPeriod* = 0. The contents of different transmissions of MCCH information can only be different if there is at least one such boundary in-between them. Value rf2 corresponds to two radio frames, value rf4 corresponds to four radio frames and so on.

mcch-RepetitionPeriodAndOffset

Defines the length and the offset of the MCCH repetition period. rf1 corresponds to a repetition period length of one radio frame, rf2 corresponds to a repetition period length of two radio frames and so on. The corresponding integer value indicates the offset of the repetition period in the number of radio frames. MCCH is scheduled in the MCCH transmission window starting from each radio frame for which: SFN mod repetition period length = offset of the repetition period.

mcch-WindowStartSlot

Indicates the slot in which MCCH transmission window starts.

– SIB21

SIB21 contains the mapping between the current and/or neighbouring carrier frequencies and MBS Frequency Selection Area Identities (FSAI).

SIB21 information element

```
-- ASN1START
-- TAG-SIB21-START
```

```
SIB21-r17 ::= SEQUENCE {
   mbs-FSAI-IntraFreg-r17
                                            MBS-FSAI-List-r17
                                                                             OPTIONAL. -- Need R
   mbs-FSAI-InterFreqList-r17
                                            MBS-FSAI-InterFreqList-r17
                                                                             OPTIONAL, -- Need R
   lateNonCriticalExtension
                                                                             OPTIONAL.
MBS-FSAI-List-r17 ::= SEQUENCE (SIZE (1..maxFSAI-MBS-r17)) OF MBS-FSAI-r17
MBS-FSAI-InterFreqList-r17 ::= SEQUENCE (SIZE (1..maxFreq)) OF MBS-FSAI-InterFreq-r17
MBS-FSAI-InterFreq-r17 ::= SEQUENCE {
   dl-CarrierFreg-r17
                              ARFCN-ValueNR,
   mbs-FSAI-List-r17
                              MBS-FSAI-List-r17
MBS-FSAI-r17 ::= OCTET STRING (SIZE (3))
-- TAG-SIB21-STOP
-- ASN1STOP
```

SIB21 field descriptions

mbs-FSAI-InterFreqList

Contains a list of neighboring frequencies including additional bands, if any, that provide MBS services and the corresponding MBS FSAIs.

mbs-FSAI-IntraFreq

Contains the list of MBS FSAIs for the current frequency. For MBS service continuity, the UE shall use all MBS FSAIs listed in *mbs-FSAI-IntraFreq* to derive the MBS frequencies of interest.

6.3.1a Positioning System information blocks

PosSystemInformation-r16-IEs

```
-- ASN1START
-- TAG-POSSYSTEMINFORMATION-R16-IES-START
PosSystemInformation-r16-IEs ::= SEQUENCE {
    posSIB-TypeAndInfo-r16
                                     SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {
       posSib1-1-r16
                                         SIBpos-r16,
       posSib1-2-r16
                                         SIBpos-r16,
                                         SIBpos-r16,
       posSib1-3-r16
       posSib1-4-r16
                                         SIBpos-r16,
       posSib1-5-r16
                                         SIBpos-r16,
       posSib1-6-r16
                                         SIBpos-r16,
       posSib1-7-r16
                                         SIBpos-r16,
       posSib1-8-r16
                                         SIBpos-r16,
       posSib2-1-r16
                                         SIBpos-r16,
       posSib2-2-r16
                                         SIBpos-r16,
```

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```
posSib2-3-r16
                                         SIBpos-r16,
        posSib2-4-r16
                                         SIBpos-r16,
        posSib2-5-r16
                                         SIBpos-r16,
        posSib2-6-r16
                                         SIBpos-r16,
        posSib2-7-r16
                                         SIBpos-r16,
        posSib2-8-r16
                                         SIBpos-r16,
        posSib2-9-r16
                                         SIBpos-r16,
        posSib2-10-r16
                                         SIBpos-r16,
        posSib2-11-r16
                                         SIBpos-r16,
                                         SIBpos-r16,
        posSib2-12-r16
        posSib2-13-r16
                                         SIBpos-r16,
        posSib2-14-r16
                                         SIBpos-r16,
        posSib2-15-r16
                                         SIBpos-r16,
        posSib2-16-r16
                                         SIBpos-r16,
        posSib2-17-r16
                                         SIBpos-r16,
        posSib2-18-r16
                                         SIBpos-r16,
        posSib2-19-r16
                                         SIBpos-r16,
        posSib2-20-r16
                                         SIBpos-r16,
        posSib2-21-r16
                                         SIBpos-r16,
        posSib2-22-r16
                                         SIBpos-r16,
        posSib2-23-r16
                                         SIBpos-r16,
        posSib3-1-r16
                                         SIBpos-r16,
                                         SIBpos-r16,
        posSib4-1-r16
        posSib5-1-r16
                                         SIBpos-r16,
        posSib6-1-r16
                                         SIBpos-r16,
        posSib6-2-r16
                                         SIBpos-r16,
        posSib6-3-r16
                                         SIBpos-r16,
        posSib1-9-v1700
                                         SIBpos-r16,
        posSib1-10-v1700
                                         SIBpos-r16,
        posSib2-24-v1700
                                         SIBpos-r16,
        posSib2-25-v1700
                                         SIBpos-r16,
        posSib6-4-v1700
                                         SIBpos-r16,
        posSib6-5-v1700
                                         SIBpos-r16,
        posSib6-6-v1700
                                         SIBpos-r16
    lateNonCriticalExtension
                                         OCTET STRING
                                                                               OPTIONAL,
    nonCriticalExtension
                                         SEOUENCE {}
                                                                               OPTIONAL
-- TAG-POSSYSTEMINFORMATION-R16-IES-STOP
-- ASN1STOP
              PosSI-SchedulingInfo
-- ASN1START
-- TAG-POSSI-SCHEDULINGINFO-START
PosSI-SchedulingInfo-r16 ::=
                                            SEQUENCE {
    posSchedulingInfoList-r16
                                                SEQUENCE (SIZE (1..maxSI-Message)) OF PosSchedulingInfo-r16,
    posSI-RequestConfig-r16
                                                    SI-RequestConfig
                                                                                                      OPTIONAL, -- Cond MSG-1
                                                                                                      OPTIONAL, -- Cond SUL-MSG-1
    posSI-RequestConfigSUL-r16
                                                    SI-RequestConfig
```

```
] ]
    posSI-RequestConfiqRedCap-r17
                                                   SI-RequestConfig
                                                                                                    OPTIONAL -- Cond REDCAP-MSG-1
    11
PosSchedulingInfo-r16 ::= SEQUENCE {
    offsetToSI-Used-r16
                                                                                                OPTIONAL, -- Need R
   posSI-Periodicity-r16
                                 ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},
                                 ENUMERATED {broadcasting, notBroadcasting},
   posSI-BroadcastStatus-r16
    posSIB-MappingInfo-r16
                                 PosSIB-MappingInfo-r16,
    . . .
PosSIB-MappingInfo-r16 ::= SEQUENCE (SIZE (1..maxSIB)) OF PosSIB-Type-r16
PosSIB-Type-r16 ::=
                             SEOUENCE {
    encrypted-r16
                                 ENUMERATED { true }
                                                                                                OPTIONAL, -- Need R
    qnss-id-r16
                                 GNSS-ID-r16
                                                                                                OPTIONAL, -- Need R
                                                                                                OPTIONAL, -- Need R
    sbas-id-r16
                                 SBAS-ID-r16
    posSibType-r16
                                 ENUMERATED { posSibType1-1, posSibType1-2, posSibType1-3, posSibType1-4, posSibType1-5, posSibType1-6,
                                              posSibType1-7, posSibType1-8, posSibType2-1, posSibType2-2, posSibType2-3, posSibType2-4,
                                              posSibType2-5, posSibType2-6, posSibType2-7, posSibType2-8, posSibType2-9, posSibType2-10,
                                              posSibType2-11, posSibType2-12, posSibType2-13, posSibType2-14, posSibType2-15,
                                              posSibType2-16, posSibType2-17, posSibType2-18, posSibType2-19, posSibType2-20,
                                              posSibType2-21, posSibType2-22, posSibType2-23, posSibType3-1, posSibType4-1,
                                              posSibType5-1,posSibType6-1, posSibType6-2, posSibType6-3,...},
    areaScope-r16
                                 ENUMERATED {true}
                                                                                                OPTIONAL -- Need S
GNSS-ID-r16 ::= SEOUENCE {
    gnss-id-r16
                             ENUMERATED{gps, sbas, gzss, galileo, glonass, bds, ...},
    . . .
SBAS-ID-r16 ::= SEOUENCE {
    sbas-id-r16
                             ENUMERATED { waas, egnos, msas, gagan, ...},
-- TAG-POSSI-SCHEDULINGINFO-STOP
-- ASN1STOP
```

PosSI-SchedulingInfo field descriptions

areaScope

Indicates that a posSIB is area specific. If the field is absent, the posSIB is cell specific.

encrypted

The presence of this field indicates that the pos-sib-type is encrypted as specified in TS 37.355 [49].

gnss-id

The presence of this field indicates that the positioning SIB type is for a specific GNSS. Indicates a specific GNSS (see also TS 37.355 [49])

posSI-BroadcastStatus

Indicates if the SI message is being broadcasted or not. Change of *posSI-BroadcastStat*us should not result in system information change notifications in Short Message transmitted with P-RNTI over DCI (see clause 6.5). The value of the indication is valid until the end of the BCCH modification period when set to *broadcasting*. If *si-SchedulingInfo-v1700* is present, the network ensures that the total number of SI messages with *posSI-BroadcastStatus* and *si-BroadcastStatus* set to *notBroadcasting* in the concatenated list of SI messages configured by *schedulingInfoList* in *si-SchedulingInfo-v1700* does not exceed the limit of *maxSI-Message* when *posSI-RequestConfig* or *posSI-RequestConfigRedCap* or *posSI-RequestConfigSUL* is configured.

posSI-RequestConfig

Configuration of Msg1 resources that the UE uses for requesting SI-messages for which posSI-BroadcastStatus is set to notBroadcasting.

posSI-RequestConfigRedCap

Configuration of Msg1 resources for *initialUplinkBWP-RedCap* that the RedCap UE uses for requesting SI-messages for which *posSI-BroadcastStatus* is set to *notBroadcasting*.

posSI-RequestConfigSUL

Configuration of Msg1 resources that the UE uses for requesting SI-messages for which posSI-BroadcastStatus is set to notBroadcasting.

posSIB-MappingInfo

List of the posSIBs mapped to this SystemInformation message.

posSibType

The positioning SIB type is defined in TS 37.355 [49].

posSI-Periodicity

Periodicity of the SI-message in radio frames, such that rf8 denotes 8 radio frames, rf16 denotes 16 radio frames, and so on. If the offsetToSI-Used is configured, the posSI-Periodicity of rf8 cannot be used.

offsetToSI-Used

This field, if present indicates that all the SI messages in *posSchedulingInfoList* are scheduled with an offset of 8 radio frames compared to SI messages in *schedulingInfoList*. offsetToSI-Used may be present only if the shortest configured SI message periodicity for SI messages in *schedulingInfoList* is 80ms. If SI offset is used, this field is present in each of the SI messages in the *posSchedulingInfoList*.

sbas-id

The presence of this field indicates that the positioning SIB type is for a specific SBAS. Indicates a specific SBAS (see also TS 37.355 [49]).

Conditional presence	Explanation
MSG-1	The field is optionally present, Need R, if posSI-BroadcastStatus is set to notBroadcasting for any SI-message included in PosSchedulingInfo. It is
	absent otherwise.
SUL-MSG-1	The field is optionally present, Need R, if supplementaryUplink is configured in ServingCellConfigCommonSIB and if posSI-BroadcastStatus is set
	to notBroadcasting for any SI-message included in PosSchedulingInfo. It is absent otherwise.
REDCAP-MSG-1	The field is optionally present, Need R, if initialUplinkBWP-RedCap is configured in UplinkConfigCommonSIB and if posSI-BroadcastStatus is set
	to notBroadcasting for any SI-message included in PosSchedulingInfo. It is absent otherwise.

SIBpos

The IE SIBpos contains positioning assistance data as defined in TS 37.355 [49].

SIBpos information element

```
-- ASN1START
-- TAG-SIPOS-START

SIBpos-r16 ::= SEQUENCE {
   assistanceDataSIB-Element-r16 OCTET STRING,
   lateNonCriticalExtension OCTET STRING OPTIONAL,
   ...
}

-- TAG-SIPOS-STOP
-- ASN1STOP
```

SIBpos field descriptions

assistanceDataSIB-Element

Parameter AssistanceDataSIBelement defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

6.3.2 Radio resource control information elements

AdditionalSpectrumEmission

The IE *AdditionalSpectrumEmission* is used to indicate emission requirements to be fulfilled by the UE (see TS 38.101-1 [15], clause 6.2.3/6.2A.3, and TS 38.101-2 [39], clause 6.2.3/6.2A.3).

AdditionalSpectrumEmission information element

```
-- ASN1START
-- TAG-ADDITIONALSPECTRUMEMISSION-START

AdditionalSpectrumEmission ::= INTEGER (0..7)

-- TAG-ADDITIONALSPECTRUMEMISSION-STOP
-- ASN1STOP
```

Alpha

The IE *Alpha* defines possible values of a the pathloss compensation coefficient for uplink power control. Value *alpha0* corresponds to the value 0, Value *alpha04* corresponds to the value 0.5 and so on. Value *alpha1* corresponds to value 1. See also clause 7.1 of TS 38.213 [13].

```
-- ASN1START
-- TAG-ALPHA-START

Alpha ::= ENUMERATED {alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}

-- TAG-ALPHA-STOP
-- ASN1STOP
```

- AMF-Identifier

The IE AMF-Identifier (AMFI) comprises of an AMF Region ID, an AMF Set ID and an AMF Pointer as specified in TS 23.003 [21], clause 2.10.1.

AMF-Identifier information element

```
-- ASN1START
-- TAG-AMF-IDENTIFIER-START

AMF-Identifier ::= BIT STRING (SIZE (24))

-- TAG-AMF-IDENTIFIER-STOP
-- ASN1STOP
```

ARFCN-ValueEUTRA

The IE ARFCN-ValueEUTRA is used to indicate the ARFCN applicable for a downlink, uplink or bi-directional (TDD) E-UTRA carrier frequency, as defined in TS 36.101 [22].

ARFCN-ValueEUTRA information element

```
-- ASN1START
-- TAG-ARFCN-VALUEEUTRA-START

ARFCN-ValueEUTRA ::= INTEGER (0..maxEARFCN)

-- TAG-ARFCN-VALUEEUTRA-STOP
-- ASN1STOP
```

ARFCN-ValueNR

The IE *ARFCN-ValueNR* is used to indicate the ARFCN applicable for a downlink, uplink or bi-directional (TDD) NR global frequency raster, as defined in TS 38.101-1 [15] and TS 38.101-2 [39], clause 5.4.2.

```
-- ASN1START
-- TAG-ARFCN-VALUENR-START
```

```
ARFCN-ValueNR ::= INTEGER (0..maxNARFCN)

-- TAG-ARFCN-VALUENR-STOP

-- ASN1STOP
```

ARFCN-ValueUTRA-FDD

The IE ARFCN-ValueUTRA-FDD is used to indicate the ARFCN applicable for a downlink (Nd, FDD) UTRA-FDD carrier frequency, as defined in TS 25.331 [45].

ARFCN-ValueUTRA-FDD information element

```
-- ASN1START
-- TAG-ARFCN-ValueUTRA-FDD-START

ARFCN-ValueUTRA-FDD-r16 ::= INTEGER (0..16383)

-- TAG-ARFCN-ValueUTRA-FDD-STOP
-- ASN1STOP
```

AvailabilityCombinationsPerCell

The IE *AvailabilityCombinationsPerCell* is used to configure the *AvailabilityCombinations* applicable for a cell of the IAB DU (see TS 38.213 [13], clause 14). Note that the IE *AvailabilityCombinationsPerCellIndex* can only be configured up to 511.

AvailabilityCombinationsPerCell information element

```
-- ASN1START
-- TAG-AVAILABILITYCOMBINATIONSPERCELL-START
AvailabilityCombinationsPerCell-r16 ::= SEQUENCE {
    availabilityCombinationsPerCellIndex-r16
                                                AvailabilityCombinationsPerCellIndex-r16,
    iab-DU-CellIdentity-r16
                                                CellIdentity,
   positionInDCI-AI-r16
                                                INTEGER(0..maxAI-DCI-PayloadSize-1-r16)
                                                                                                                      OPTIONAL, -- Need M
   availabilityCombinations-r16
                                                SEQUENCE (SIZE (1..maxNrofAvailabilityCombinationsPerSet-r16)) OF AvailabilityCombination-r16,
    . . . ,
    [ [
    availabilityCombinationsRB-Groups-r17 SEQUENCE (SIZE (1..maxNrofAvailabilityCombinationsPerSet-r16)) OF AvailabilityCombinationRB-Groups-r17
OPTIONAL -- Need M
    ]],
    [ [
    positionInDCI-AI-RBGroups-v1720
                                                                                                                      OPTIONAL -- Need M
                                                INTEGER(0..maxAI-DCI-PayloadSize-1-r16)
AvailabilityCombinationsPerCellIndex-r16 ::= INTEGER(0..maxNrofDUCells-r16)
```

```
AvailabilityCombination-r16 ::=
                                       SEOUENCE {
    availabilityCombinationId-r16
                                           AvailabilityCombinationId-r16,
    resourceAvailability-r16
                                           SEQUENCE (SIZE (1..maxNrofResourceAvailabilityPerCombination-r16)) OF INTEGER (0..7)
AvailabilityCombinationId-r16 ::=
                                       INTEGER (0..maxNrofAvailabilityCombinationsPerSet-1-r16)
AvailabilityCombinationRB-Groups-r17 ::= SEOUENCE {
    availabilityCombinationId-r17 AvailabilityCombinationId-r16,
    rb-SetGroups-r17
                                    SEQUENCE (SIZE (1..maxNrofRB-SetGroups-r17)) OF RB-SetGroup-r17
                                                                                                                              OPTIONAL, -- Need R
    resourceAvailability-r17
                                    SEQUENCE (SIZE (1..maxNrofResourceAvailabilityPerCombination-r16)) OF INTEGER (0..7) OPTIONAL -- Need R
RB-SetGroup-r17 ::=
                         SEQUENCE {
    resourceAvailability-r17 SEQUENCE (SIZE (1..maxNrofResourceAvailabilityPerCombination-r16)) OF INTEGER (0..7) OPTIONAL, -- Need R
    rb-Sets-r17
                              SEQUENCE (SIZE (1..maxNrofRB-Sets-r17)) OF INTEGER (0..7)
                                                                                                                   OPTIONAL -- Need R
-- TAG-AVAILABILITYCOMBINATIONSPERCELL-STOP
-- ASN1STOP
```

AvailabilityCombination field descriptions

availabilityCombinationId

This ID is used in the DCI Format 2_5 payload to dynamically select this Availability Combination, see TS 38.213 [13], clause 14.

resourceAvailability

Indicates the resource availability of soft symbols for a set of consecutive slots in the time domain. The meaning of this field is described in TS 38.213 [13], Table 14.3. If included in *RB-SetGroup* within *AvailabilityCombinationRB-Groups-r17*, it indicates the availability of soft resources for an RB set group. If included in *AvailabilityCombinationRB-Groups-r17* when the *rb-SetGroups* is not configured, it indicates the availability of soft resources in one or multiple slots for all RB sets of a DU cell.

AvailabilityCombinationsPerCell field descriptions

iab-DU-CellIdentity

The ID of the IAB-DU cell for which the availability Combinations are applicable.

positionInDCI-AI

The (starting) position (bit) of the availabilityCombinationId for the indicated IAB-DU cell (iab-DU-CellIdentity) within the DCI payload. If positionInDCI-AI-RBGroups is not configured, it applies to the availabilityCombinationId included in availabilityCombinations and in availabilityCombinationsRBGroups. If positionInDCI-AI-RBGroups is configured, it applies to the availabilityCombinationId included in availabilityCombinations.

positionInDCI-AI-RBGroups

The (starting) position (bit) of the availabilityCombinationId associated to the availabilityCombinationsRBGroups for the indicated IAB-DU cell (iab-DU-CellIdentity) within the DCI payload.

AvailabilityCombinationRB-Groups field descriptions

rb-SetGroups

Indicates the RB set groups configured for the availability combination. Each group includes consecutive RB sets.

rh-Sets

Indicates the one or more RB set indexes associated to one or more RB sets configured for one RB set group.

AvailabilityIndicator

The IE AvailabilityIndicator is used to configure monitoring a PDCCH for Availability Indicators (AI).

AvailabilityIndicator information element

AvailabilityIndicator field descriptions

ai-RNTI

Used by an IAB-MT for detection of DCI format 2 5 indicating AvailabilityCombinationId for an IAB-DU's cells.

availableCombToAddModList

A list of availabilityCombinations to add for the IAB-DU's cells. (see TS 38.213 [13], clause 14).

availableCombToReleaseList

A list of availabilityCombinations to release for the IAB-DU's cells. (see TS 38.213 [13], clause 14).

dci-PayloadSizeAl

Total length of the DCI payload scrambled with ai-RNTI (see TS 38.213 [13]).

BAP-RoutingID

The IE BAP-RoutingID is used for IAB-node to configure the BAP Routing ID.

BAP-RoutingID information element

```
-- ASN1START
-- TAG-BAPROUTINGID-START

BAP-RoutingID-r16::= SEQUENCE {
   bap-Address-r16 BIT STRING (SIZE (10)),
   bap-Pathid-r16 BIT STRING (SIZE (10))
}

-- TAG-BAPROUTINGID-STOP
```

-- ASN1STOP

BAP-RoutingID field descriptions bap-Address The ID of a destination IAB-node or IAB-donor-DU used in the BAP header. bap-PathId The ID of a path used in the BAP header.

BeamFailureRecoveryConfig

The IE BeamFailureRecoveryConfig is used to configure the UE with RACH resources and candidate beams for beam failure recovery in case of beam failure detection. See also TS 38.321 [3], clause 5.1.1.

BeamFailureRecoveryConfig information element

```
-- ASN1START
-- TAG-BEAMFAILURERECOVERYCONFIG-START
BeamFailureRecoveryConfig ::=
                                    SEOUENCE {
                                        INTEGER (0..137)
    rootSequenceIndex-BFR
                                                                                                                    OPTIONAL, -- Need M
    rach-ConfigBFR
                                        RACH-ConfigGeneric
                                                                                                                    OPTIONAL, -- Need M
    rsrp-ThresholdSSB
                                        RSRP-Range
                                                                                                                    OPTIONAL, -- Need M
    candidateBeamRSList
                                        SEQUENCE (SIZE(1..maxNrofCandidateBeams)) OF PRACH-ResourceDedicatedBFR
                                                                                                                    OPTIONAL, -- Need M
    ssb-perRACH-Occasion
                                        ENUMERATED {oneEighth, oneFourth, oneHalf, one, two,
                                                        four, eight, sixteen}
                                                                                                                    OPTIONAL, -- Need M
    ra-ssb-OccasionMaskIndex
                                        INTEGER (0..15)
                                                                                                                    OPTIONAL, -- Need M
                                                                                                                    OPTIONAL, -- Need R
    recoverySearchSpaceId
                                        SearchSpaceId
                                        RA-Prioritization
    ra-Prioritization
                                                                                                                    OPTIONAL, -- Need R
    beamFailureRecoveryTimer
                                        ENUMERATED {ms10, ms20, ms40, ms60, ms80, ms100, ms150, ms200}
                                                                                                                    OPTIONAL, -- Need M
    . . . ,
    [ [
    msg1-SubcarrierSpacing
                                        SubcarrierSpacing
                                                                                                                    OPTIONAL -- Need M
    ]],
    ra-PrioritizationTwoStep-r16
                                        RA-Prioritization
                                                                                                                    OPTIONAL, -- Need R
    candidateBeamRSListExt-v1610
                                        SetupRelease{ CandidateBeamRSListExt-r16 }
                                                                                                                    OPTIONAL -- Need M
    11,
    11
                                        ENUMERATED {true}
    spCell-BFR-CBRA-r16
                                                                                                                    OPTIONAL -- Need R
    11
PRACH-ResourceDedicatedBFR ::=
                                    CHOICE {
    ssb
                                        BFR-SSB-Resource,
    csi-RS
                                        BFR-CSIRS-Resource
BFR-SSB-Resource ::=
                                    SEOUENCE {
```

```
ssb
                                       SSB-Index,
   ra-PreambleIndex
                                       INTEGER (0..63),
BFR-CSIRS-Resource ::=
                                   SEQUENCE {
   csi-RS
                                       NZP-CSI-RS-ResourceId,
   ra-OccasionList
                                       SEQUENCE (SIZE(1..maxRA-OccasionsPerCSIRS)) OF INTEGER (0..maxRA-Occasions-1)
                                                                                                                     OPTIONAL, -- Need R
   ra-PreambleIndex
                                       INTEGER (0..63)
                                                                                                                      OPTIONAL, -- Need R
CandidateBeamRSListExt-r16::=
                                   SEQUENCE (SIZE(1.. maxNrofCandidateBeamsExt-r16)) OF PRACH-ResourceDedicatedBFR
-- TAG-BEAMFAILURERECOVERYCONFIG-STOP
-- ASN1STOP
```

BeamFailureRecoveryConfig field descriptions

beamFailureRecoveryTimer

Timer for beam failure recovery timer. Upon expiration of the timer the UE does not use CFRA for BFR. Value in ms. Value *ms10* corresponds to 10 ms, value *ms20* corresponds to 20 ms, and so on.

candidateBeamRSList, candidateBeamRSListExt-v1610

Set of reference signals (CSI-RS and/or SSB) identifying the candidate beams for recovery and the associated RA parameters. This set includes all elements of candidateBeamRSList (without suffix) and all elements of candidateBeamRSListExt-v1610. The UE maintains candidateBeamRSList and candidateBeamRSListExt-v1610 separately: Receiving candidateBeamRSListExt-v1610 set to release releases only the entries that were configured by candidateBeamRSListExt-v1610, and receiving candidateBeamRSListExt-v1610 set to setup replaces only the entries that were configured by candidateBeamRSListExt-v1610 with the newly signalled entries. The network configures these reference signals to be within the linked DL BWP (i.e., within the DL BWP with the same bwp-Id) of the UL BWP in which the BeamFailureRecoveryConfig is provided.

msg1-SubcarrierSpacing

Subcarrier spacing for contention free beam failure recovery (see TS 38.211 [16], clause 5.3.2).

Only the following values are applicable depending on the used frequency:

FR1: 15 or 30 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

rsrp-ThresholdSSB

L1-RSRP threshold used for determining whether a candidate beam may be used by the UE to attempt contention free random access to recover from beam failure (see TS 38.213 [13], clause 6).

ra-prioritization

Parameters which apply for prioritized random access procedure for BFR (see TS 38.321 [3], clause 5.1.1).

ra-PrioritizationTwoStep

Parameters which apply for prioritized 2-step random access procedure for BFR (see TS 38.321 [3], clause 5.1.1).

ra-ssb-OccasionMaskIndex

Explicitly signalled PRACH Mask Index for RA Resource selection in TS 38.321 [3]. The mask is valid for all SSB resources.

rach-ConfigBFR

Configuration of random access parameters for BFR.

recoverySearchSpaceId

Search space to use for BFR RAR. The network configures this search space to be within the linked DL BWP (i.e., within the DL BWP with the same *bwp-Id*) of the UL BWP in which the *BeamFailureRecoveryConfig* is provided. The CORESET associated with the recovery search space cannot be associated with another search space. Network always configures the UE with a value for this field when contention free random access resources for BFR are configured.

rootSequenceIndex-BFR

PRACH root sequence index (see TS 38.211 [16], clause 6.3.3.1) for beam failure recovery.

spCell-BFR-CBRA

Indicates that UE is configured to send BFR MAC CE for SpCell BFR as specified in TS38.321 [3].

ssb-perRACH-Occasion

Number of SSBs per RACH occasion for CF-BFR, see TS 38.213 [13], clause 8.1.

BFR-CSIRS-Resource field descriptions

csi-RS

The ID of a NZP-CSI-RS-Resource configured in the CSI-MeasConfig of this serving cell. This reference signal determines a candidate beam for beam failure recovery (BFR).

ra-OccasionList

RA occasions that the UE shall use when performing BFR upon selecting the candidate beam identified by this CSI-RS. The network ensures that the RA occasion indexes provided herein are also configured by *prach-ConfigurationIndex* and *msg1-FDM*. Each RACH occasion is sequentially numbered, first, in increasing order of frequency resource indexes for frequency multiplexed PRACH occasions; second, in increasing order of time resource indexes for time multiplexed PRACH occasions within a PRACH slot and Third, in increasing order of indexes for PRACH slots.

If the field is absent the UE uses the RA occasion associated with the SSB that is QCLed with this CSI-RS.

ra-PreambleIndex

The RA preamble index to use in the RA occasions associated with this CSI-RS. If the field is absent, the UE uses the preamble index associated with the SSB that is QCLed with this CSI-RS.

BFR-SSB-Resource field descriptions

ra-PreambleIndex

The preamble index that the UE shall use when performing BFR upon selecting the candidate beams identified by this SSB.

ssb

The ID of an SSB transmitted by this serving cell. It determines a candidate beam for beam failure recovery (BFR).

BeamFailureRecoveryRSConfig

The IE BeamFailureRecoveryRSConfig is used to configure the UE with candidate beams for beam failure recovery in case of beam failure detection. See also TS 38.321 [3], clause 5.17.

BeamFailureRecoveryRSConfig information element

BeamFailureRecoveryRSConfig field descriptions

candidateBeamRS-List

A list of reference signals (CSI-RS and/or SSB) identifying the candidate beams for recovery. The network always configures this parameter in every instance of this IE.

candidateBeamRS-List2

A list of reference signals (CSI-RS and/or SSB) identifying the candidate beams for recovery.

rsrp-ThresholdBFR

L1-RSRP threshold used for determining whether a candidate beam may be included by the UE in BFR MAC CE (see TS 38.213 [13], clause 6). The network always configures this parameter in every instance of this IE.

BetaOffsets

-- TAG-BETAOFFSETS-STOP

-- ASN1STOP

The IE BetaOffsets is used to configure beta-offset values, see TS 38.213 [13], clause 9.3.

BetaOffsets information element

```
-- ASN1START
-- TAG-BETAOFFSETS-START
BetaOffsets ::=
                                    SEQUENCE {
   betaOffsetACK-Index1
                                        INTEGER(0..31)
                                                                                                                 OPTIONAL, -- Need S
   betaOffsetACK-Index2
                                        INTEGER(0..31)
                                                                                                                 OPTIONAL, -- Need S
   betaOffsetACK-Index3
                                        INTEGER(0..31)
                                                                                                                 OPTIONAL, -- Need S
                                                                                                                 OPTIONAL, -- Need S
   betaOffsetCSI-Part1-Index1
                                        INTEGER (0..31)
                                                                                                                 OPTIONAL, -- Need S
   betaOffsetCSI-Part1-Index2
                                        INTEGER (0..31)
                                                                                                                 OPTIONAL, -- Need S
   betaOffsetCSI-Part2-Index1
                                        INTEGER (0..31)
                                                                                                                 OPTIONAL -- Need S
   betaOffsetCSI-Part2-Index2
                                        INTEGER (0..31)
```

BetaOffsets field descriptions

betaOffsetACK-Index1

Up to 2 bits HARQ-ACK (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 11.

betaOffsetACK-Index2

Up to 11 bits HARQ-ACK (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 11.

betaOffsetACK-Index3

Above 11 bits HARQ-ACK (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 11.

betaOffsetCSI-Part1-Index1

Up to 11 bits of CSI part 1 bits (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 13.

betaOffsetCSI-Part1-Index2

Above 11 bits of CSI part 1 bits (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 13.

betaOffsetCSI-Part2-Index1

Up to 11 bits of CSI part 2 bits (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 13.

betaOffsetCSI-Part2-Index2

Above 11 bits of CSI part 2 bits (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 13.

BetaOffsetsCrossPri

The IE BetaOffsetsCrossPri is used to configure beta-offset values for cross-priority HARQ-ACK multiplexing on PUSCH.

BetaOffsetsCrossPri information element

```
-- ASN1START
-- TAG-BETAOFFSETSCROSSPRI-START

BetaOffsetsCrossPri-r17 ::= SEQUENCE (SIZE(3)) OF INTEGER(0..31)
-- TAG-BETAOFFSETSCROSSPRI-STOP
-- ASN1STOP
```

BH-LogicalChannelIdentity

The IE BH-LogicalChannelIdentity is used to identify a logical channel between an IAB-node and its parent IAB-node or IAB-donor-DU.

BH-LogicalChannelIdentity information element

-- ASN1STOP

BH-LogicalChannelldentity field descriptions
bh-LogicalChannelldentity
ID used for the MAC logical channel.
bh-LogicalChannelIdentityExt
ID used for the MAC logical channel.

BH-LogicalChannelIdentity-Ext

The IE BH-LogicalChannelIdentity-Ext is used to identify a logical channel between an IAB-node and its parent node.

BH-LogicalChannelIdentity-Ext information element

```
-- ASN1START
-- TAG-BHLOGICALCHANNELIDENTITYEXT-START

BH-LogicalChannelIdentity-Ext-r16 ::= INTEGER (320.. maxLC-ID-Iab-r16)
-- TAG-BHLOGICALCHANNELIDENTITYEXT-STOP
-- ASN1STOP
```

BH-RLC-ChannelConfig

The IE BH-RLC-Channel configure an RLC entity, a corresponding logical channel in MAC for BH RLC channel between IAB-node and its parent node.

BH-RLC-ChannelConfig information element

BH-RLC-ChannelConfig field descriptions

bh-LogicalChannelldentity

Indicates the logical channel id for BH RLC channel of the IAB-node.

bh-RLC-ChannelID

Indicates the BH RLC channel in the link between IAB-MT of the IAB-node and IAB-DU of the parent IAB-node or IAB-donor-DU.

reestablishRLC

Indicates that RLC should be re-established.

rlc-Config

Determines the RLC mode (UM, AM) and provides corresponding parameters.

Conditional Presence	Explanation
LCH-Setup	This field is mandatory present upon creation of a new logical channel for a BH RLC channel. It is optionally present, Need M, otherwise.
LCH-SetupOnly	This field is mandatory present upon creation of a new logical channel for a BH RLC channel. It is absent, Need M otherwise.

BH-RLC-ChannelID

The IE BH-RLC-ChannelID is used to identify a BH RLC channel in the link between IAB-MT of the IAB-node and IAB-DU of the parent IAB-node or IAB-donor-DU.

BH-RLC-ChannelID information element

```
-- ASN1START
-- TAG-BHRLCCHANNELID-START

BH-RLC-ChannelID-r16 ::= BIT STRING (SIZE (16))

-- TAG-BHRLCCHANNELID-STOP
-- ASN1STOP
```

BSR-Config

The IE BSR-Config is used to configure buffer status reporting.

BSR-Config information element

```
}
-- TAG-BSR-CONFIG-STOP
-- ASN1STOP
```

BSR-Config field descriptions

logicalChannelSR-DelayTimer

Value in number of subframes. Value sf20 corresponds to 20 subframes, sf40 corresponds to 40 subframes, and so on.

periodicBSR-Timer

Value in number of subframes. Value sf1 corresponds to 1 subframe, value sf5 corresponds to 5 subframes and so on.

retxBSR-Timer

-- TAG-BWP-STOP -- ASN1STOP

Value in number of subframes. Value sf10 corresponds to 10 subframes, value sf20 corresponds to 20 subframes and so on.

– BWP

The IE BWP is used to configure generic parameters of a bandwidth part as defined in TS 38.211 [16], clause 4.5, and TS 38.213 [13], clause 12.

For each serving cell the network configures at least an initial downlink bandwidth part and one (if the serving cell is configured with an uplink) or two (if using supplementary uplink (SUL)) initial uplink bandwidth parts. Furthermore, the network may configure additional uplink and downlink bandwidth parts for a serving cell.

The uplink and downlink bandwidth part configurations are divided into common and dedicated parameters.

BWP information element

```
-- ASN1START
-- TAG-BWP-START

BWP ::= SEQUENCE {
    locationAndBandwidth INTEGER (0..37949),
    subcarrierSpacing SubcarrierSpacing,
    cyclicPrefix ENUMERATED { extended }

}

OPTIONAL -- Need R
```

BWP field descriptions

cyclicPrefix

Indicates whether to use the extended cyclic prefix for this bandwidth part. If not set, the UE uses the normal cyclic prefix. Normal CP is supported for all subcarrier spacings and slot formats. Extended CP is supported only for 60 kHz subcarrier spacing. (see TS 38.211 [16], clause 4.2). Except for SUL, the network ensures the same cyclic prefix length is used in active DL BWP and active UL BWP within a serving cell.

locationAndBandwidth

Frequency domain location and bandwidth of this bandwidth part. The value of the field shall be interpreted as resource indicator value (RIV) as defined TS 38.214 [19] with

assumptions as described in TS 38.213 [13], clause 12, i.e. setting N_{BWP}^{size} =275. The first PRB is a PRB determined by subcarrierSpacing of this BWP and offsetToCarrier (configured in SCS-SpecificCarrier contained within FrequencyInfoDL / FrequencyInfoUL / FrequencyInfoUL -SIB / FrequencyInfoDL-SIB within ServingCellConfigCommon / ServingCellConfigCommonSIB) corresponding to this subcarrier spacing. In case of TDD, a BWP-pair (UL BWP and DL BWP with the same bwp-Id) must have the same center frequency (see TS 38.213 [13], clause 12)

subcarrierSpacing

Subcarrier spacing to be used in this BWP for all channels and reference signals unless explicitly configured elsewhere. Corresponds to subcarrier spacing according to TS 38.211 [16], table 4.2-1. The value kHz15 corresponds to μ =0, value kHz30 corresponds to μ =1, and so on.

Only the following values are applicable depending on the used frequency:

FR1: 15, 30, or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

For the initial DL BWP and operation in licensed spectrum this field has the same value as the field *subCarrierSpacingCommon* in *MIB* of the same serving cell. Except for SUL, the network ensures the same subcarrier spacing is used in active DL BWP and active UL BWP within a serving cell. For the initial DL BWP and operation with shared spectrum channel access, the value of this field corresponds to the subcarrier spacing of the SSB associated to the initial DL BWP.

- BWP-Downlink

The IE BWP-Downlink is used to configure an additional downlink bandwidth part (not for the initial BWP).

BWP-Downlink information element

```
-- ASN1START
-- TAG-BWP-DOWNLINK-START

BWP-Downlink ::= SEQUENCE {
    bwp-Id BWP-Id,
    bwp-Common BWP-DownlinkCommon OPTIONAL, -- Cond SetupOtherBWP bwp-Dedicated OPTIONAL, -- Cond SetupOtherBWP ...
}

-- TAG-BWP-DOWNLINK-STOP ASN1STOP
```

BWP-Downlink field descriptions

bwp-ld

An identifier for this bandwidth part. Other parts of the RRC configuration use the *BWP-Id* to associate themselves with a particular bandwidth part. The network configures the BWPs with consecutive IDs from 1. The Network does not include the value 0, since value 0 is reserved for the initial BWP.

Conditional Presence	Explanation
SetupOtherBWP	The field is mandatory present upon configuration of a new DL BWP. The field is optionally present, Need M, otherwise.

BWP-DownlinkCommon

The IE *BWP-DownlinkCommon* is used to configure the common parameters of a downlink BWP. They are "cell specific" and the network ensures the necessary alignment with corresponding parameters of other UEs. The common parameters of the initial bandwidth part of the PCell are also provided via system information. For all other serving cells, the network provides the common parameters via dedicated signalling.

BWP-DownlinkCommon information element

BWP-DownlinkCommon field descriptions

pdcch-ConfigCommon

Cell specific parameters for the PDCCH of this BWP. This field is absent for a dormant BWP.

pdsch-ConfigCommon

Cell specific parameters for the PDSCH of this BWP.

BWP-DownlinkDedicated

The IE BWP-DownlinkDedicated is used to configure the dedicated (UE specific) parameters of a downlink BWP.

BWP-DownlinkDedicated information element

```
-- TAG-BWP-DOWNLINKDEDICATED-START
BWP-DownlinkDedicated ::=
                                   SEQUENCE {
    pdcch-Config
                                       SetupRelease { PDCCH-Config }
                                                                                                         OPTIONAL. -- Need M
    pdsch-Config
                                       SetupRelease {
                                                      PDSCH-Config }
                                                                                                         OPTIONAL. -- Need M
   sps-Config
                                       SetupRelease {
                                                      SPS-Config }
                                                                                                                    -- Need M
                                                                                                         OPTIONAL,
    radioLinkMonitoringConfig
                                       SetupRelease { RadioLinkMonitoringConfig }
                                                                                                         OPTIONAL.
                                                                                                                    -- Need M
    11
    sps-ConfigToAddModList-r16
                                       SPS-ConfigToAddModList-r16
                                                                                                         OPTIONAL, -- Need N
    sps-ConfigToReleaseList-r16
                                       SPS-ConfigToReleaseList-r16
                                                                                                         OPTIONAL, -- Need N
    sps-ConfigDeactivationStateList-r16 SPS-ConfigDeactivationStateList-r16
                                                                                                         OPTIONAL, -- Need R
    beamFailureRecoverySCellConfig-r16 SetupRelease {BeamFailureRecoveryRSConfig-r16}
                                                                                                         OPTIONAL, -- Cond SCellOnly
    sl-PDCCH-Config-r16
                                       SetupRelease { PDCCH-Config
                                                                                                         OPTIONAL.
                                                                                                                   -- Need M
    sl-V2X-PDCCH-Config-r16
                                       SetupRelease { PDCCH-Config }
                                                                                                         OPTIONAL
                                                                                                                    -- Need M
    ]],
    ] ]
    preConfGapStatus-r17
                                       BIT STRING (SIZE (maxNrofGapId-r17))
                                                                                                         OPTIONAL, -- Cond PreConfigMG
    beamFailureRecoverySpCellConfig-r17 SetupRelease { BeamFailureRecoveryRSConfig-r16}
                                                                                                         OPTIONAL, -- Cond SpCellOnly
    harg-FeedbackEnablingforSPSactive-r17 BOOLEAN
                                                                                                         OPTIONAL, -- Need R
    cfr-ConfigMulticast-r17
                                       SetupRelease { CFR-ConfigMulticast-r17 }
                                                                                                         OPTIONAL, -- Need M
    dl-PPW-PreConfigToAddModList-r17
                                       DL-PPW-PreConfigToAddModList-r17
                                                                                                         OPTIONAL, -- Need N
    dl-PPW-PreConfigToReleaseList-r17
                                       DL-PPW-PreConfigToReleaseList-r17
                                                                                                         OPTIONAL, -- Need N
                                       NonCellDefiningSSB-r17
                                                                                                         OPTIONAL, -- Need R
    nonCellDefiningSSB-r17
    servingCellMO-r17
                                       MeasObjectId
                                                                                                     OPTIONAL -- Cond MeasObject-NCD-SSB
    11
SPS-ConfigToAddModList-r16 ::=
                                       SEQUENCE (SIZE (1..maxNrofSPS-Config-r16)) OF SPS-Config
SPS-ConfigToReleaseList-r16 ::=
                                       SEQUENCE (SIZE (1..maxNrofSPS-Config-r16)) OF SPS-ConfigIndex-r16
SPS-ConfigDeactivationState-r16 ::=
                                       SEQUENCE (SIZE (1..maxNrofSPS-Config-r16)) OF SPS-ConfigIndex-r16
SPS-ConfigDeactivationStateList-r16 ::= SEOUENCE (SIZE (1..maxNrofSPS-DeactivationState)) OF SPS-ConfigDeactivationState-r16
DL-PPW-PreConfigToAddModList-r17 ::=
                                       SEQUENCE (SIZE (1..maxNrofPPW-Config-r17)) OF DL-PPW-PreConfig-r17
DL-PPW-PreConfigToReleaseList-r17 ::=
                                       SEQUENCE (SIZE (1..maxNrofPPW-Config-r17)) OF DL-PPW-ID-r17
-- TAG-BWP-DOWNLINKDEDICATED-STOP
-- ASN1STOP
```

BWP-DownlinkDedicated field descriptions

beamFailureRecoverySCellConfig

Configuration of candidate RS for beam failure recovery on SCells.

beamFailureRecoverySpCellConfig

Configuration of candidate RS for beam failure recovery on the SpCell. This field can only be configured when beamfailure is configured in RadioLinkMonitoringConfig.

cfr-ConfigMulticast

UE specific common frequency resource configuration for MBS multicast for one dedicated BWP. This field can be configured within at most one serving cell.

dl-PPW-PreConfigToAddModList

Indicates a list of DL-PRS processing window configurations to be added or modified for the dedicated DL BWP.

dl-PPW-PreConfigToReleaseList

Indicates a list of DL-PRS processing window configurations to be released for the dedicated DL BWP.

harg-FeedbackEnablingforSPSactive

If enabled, UE reports ACK/NACK for the first SPS PDSCH after activation, regardless of if HARQ feedback is enabled or disabled corresponding to the first SPS PDSCH after activation. Otherwise, UE follows configuration of HARQ feedback enabled/disabled corresponding to the first SPS PDSCH after activation.

nonCellDefiningSSB

If configured, the RedCap UE operating in this BWP uses this SSB for the purposes for which it would otherwise have used the CD-SSB of the serving cell (e.g. obtaining sync, measurements, RLM). Furthermore, other parts of the BWP configuration that refer to an SSB (e.g. the "SSB" configured in the QCL-Info IE; the "ssb-Index" configured in the RadioLinkMonitoringRS; CFRA-SSB-Resource; PRACH-ResourceDedicatedBFR) refer implicitly to this NCD-SSB.

The NCD-SSB has the same values for the properties (e.g., ssb-PositionsInBurst, PCI, ssb-periodicity, ssb-PBCH-BlockPower) of the corresponding CD-SSB apart from the values of the properties configured in the NonCellDefiningSSB-r17 IE.

pdcch-Config

UE specific PDCCH configuration for one BWP.

pdsch-Config

UE specific PDSCH configuration for one BWP.

preConfGapStatus

Indicates whether the pre-configured measurement gaps (i.e. the gaps configured with *preConfigInd*) are activated or deactivated upon the switch to this BWP. If this field is configured, the UE shall apply network-controlled mechanism for activation and deactivation of the pre-configured measurement gaps, otherwise the UE shall apply the autonomous activation/deactivation mechanism, as specified in TS 38.133 [14]. The first/leftmost bit corresponds to the measurement gap with gap ID 1, the second bit corresponds to measurement gap with gap ID 2, and so on. Value 0 indicates that the corresponding pre-configured measurement gap is deactivated while value 1 indicates that the corresponding pre-configured measurement gap is not a pre-configured measurement gap.

servingCellMO

meas ObjectId of the Meas ObjectNR in Meas Config which is associated to the serving cell. For this Meas ObjectNR, the following relationship applies between this Meas ObjectNR and nonCellDefiningSSB in BWP-DownlinkDedicated of the associated downlink BWP: if ssbFrequency is configured, its value is the same as the absolute Frequency SSB in the nonCellDefiningSSB. If the field is present in a downlink BWP and the BWP is activated, the RedCap UE uses this measurement object for serving cell measurements, otherwise, the RedCap UE uses the serving CellMO in ServingCellConfig IE.

sps-Config

UE specific SPS (Semi-Persistent Scheduling) configuration for one BWP. Except for reconfiguration with sync, the NW does not reconfigure sps-Config when there is an active configured downlink assignment (see TS 38.321 [3]). However, the NW may release the sps-Config at any time. Network can only configure SPS in one BWP using either this field or sps-ConfigToAddModList.

sps-ConfigDeactivationStateList

Indicates a list of the deactivation states in which each state can be mapped to a single or multiple SPS configurations to be deactivated, see clause 10.2 in TS 38.213 [13]. If a state is mapped to multiple SPS configurations, each of these SPS configurations is configured with the same *harq-CodebookID*.

sps-ConfigToAddModList

Indicates a list of one or more DL SPS configurations to be added or modified in one BWP. Except for reconfiguration with sync, the NW does not reconfigure a SPS configuration when it is active (see TS 38.321 [3]).

sps-ConfigToReleaseList

Indicates a list of one or more DL SPS configurations to be released. The NW may release a SPS configuration at any time.

radioLinkMonitoringConfig

UE specific configuration of radio link monitoring for detecting cell- and beam radio link failure occasions. The maximum number of failure detection resources should be limited up to 8 for both cell and beam radio link failure detection. For SCells, only periodic 1-port CSI-RS can be configured in IE *RadioLinkMonitoringConfig*.

sI-PDCCH-Config

Indicates the UE specific PDCCH configurations for receiving the SL grants (via SL-RNTI or SL-CS-RNTI) for NR sidelink communication/discovery.

sI-V2X-PDCCH-Config

Indicates the UE specific PDCCH configurations for receiving SL grants (i.e. sidelink SPS) for V2X sidelink communication.

Conditional Presence	Explanation
MeasObject-NCD-SSB	This field is optionally present Need S if the UE is a RedCap UE and nonCellDefiningSSB is configured in this DL BWP. It is absent otherwise.
PreConfigMG	The field is optionally present, Need R, if there is at least one per UE gap configured with <i>preConfigInd</i> or there is at least one per FR gap of the same FR which the BWP belongs to and configured with <i>preConfigInd</i> . It is absent, Need R, otherwise.
ScellOnly	The field is optionally present, Need M, in the BWP-DownlinkDedicated of an Scell. It is absent otherwise.
SpCellOnly	The field is optionally present, Need M, in the BWP-DownlinkDedicated of an Spcell. It is absent otherwise.

– BWP-Id

The IE BWP-Id is used to refer to Bandwidth Parts (BWP). The initial BWP (including RedCap-specific initial BWP, if configured) is referred to by BWP-Id 0. The other BWPs are referred to by BWP-Id 1 to maxNrofBWPs.

BWP-Id information element

```
-- ASN1START
-- TAG-BWP-ID-START

BWP-Id ::= INTEGER (0..maxNrofBWPs)

-- TAG-BWP-ID-STOP
-- ASN1STOP
```

BWP-Uplink

The IE BWP-Uplink is used to configure an additional uplink bandwidth part (not for the initial BWP).

BWP-Uplink information element

```
-- ASN1START
```

⁻⁻ TAG-BWP-UPLINK-START

```
BWP-Uplink ::= SEQUENCE {
bwp-Id BWP-Id,
bwp-Common BWP-UplinkCommon OPTIONAL, -- Cond SetupOtherBWP bwp-Dedicated BWP-UplinkDedicated OPTIONAL, -- Cond SetupOtherBWP ...
}

-- TAG-BWP-UPLINK-STOP -- ASN1STOP
```

BWP-Uplink field descriptions

bwp-ld

An identifier for this bandwidth part. Other parts of the RRC configuration use the *BWP-Id* to associate themselves with a particular bandwidth part. The network configures the BWPs with consecutive IDs from 1. The Network does not include the value 0, since value 0 is reserved for the initial BWP.

Conditional Presence	Explanation
SetupOtherBWP	The field is mandatory present upon configuration of a new UL BWP. The field is optionally present, Need M, otherwise.

BWP-UplinkCommon

The IE BWP-UplinkCommon is used to configure the common parameters of an uplink BWP. They are "cell specific" and the network ensures the necessary alignment with corresponding parameters of other UEs. The common parameters of the initial bandwidth part of the PCell are also provided via system information. For all other serving cells, the network provides the common parameters via dedicated signalling.

BWP-UplinkCommon information element

```
-- ASN1START
-- TAG-BWP-UPLINKCOMMON-START
BWP-UplinkCommon ::=
                                   SEOUENCE {
    genericParameters
   rach-ConfigCommon
                                       SetupRelease { RACH-ConfigCommon }
                                                                                                              OPTIONAL, -- Need M
   pusch-ConfigCommon
                                       SetupRelease { PUSCH-ConfigCommon
                                                                                                               OPTIONAL,
                                                                                                                          -- Need M
                                       SetupRelease { PUCCH-ConfigCommon }
                                                                                                              OPTIONAL,
                                                                                                                          -- Need M
    pucch-ConfigCommon
    . . . ,
                                       SetupRelease { RACH-ConfigCommon }
    rach-ConfigCommonIAB-r16
                                                                                                               OPTIONAL,
                                                                                                                          -- Need M
    useInterlacePUCCH-PUSCH-r16
                                       ENUMERATED {enabled}
                                                                                                               OPTIONAL,
                                                                                                                          -- Need R
    msgA-ConfigCommon-r16
                                       SetupRelease { MsgA-ConfigCommon-r16 }
                                                                                                               OPTIONAL
                                                                                                                          -- Cond SpCellOnly2
    ]],
    enableRA-PrioritizationForSlicing-r17 BOOLEAN
                                                                                                    OPTIONAL, -- Cond RA-PrioSliceAI
                                                                                                    OPTIONAL, -- Cond SpCellOnly2
    additionalRACH-ConfigList-r17
                                       SetupRelease { AdditionalRACH-ConfigList-r17 }
                                                                                                    OPTIONAL, -- Need R
    rsrp-ThresholdMsg3-r17
                                       RSRP-Range
    numberOfMsg3-RepetitionsList-r17 SEQUENCE (SIZE (4)) OF NumberOfMsg3-Repetitions-r17
                                                                                                           OPTIONAL, -- Cond Msg3Rep
    mcs-Msg3-Repetitions-r17
                                       SEQUENCE (SIZE (8)) OF INTEGER (0..31)
                                                                                                            OPTIONAL -- Cond Msg3Rep
```

BWP-UplinkCommon field descriptions

additionalRACH-ConfigList

List of feature or feature combination-specific RACH configurations, i.e. the RACH configurations configured in addition to the one configured by *rach-ConfigCommon* and by *msgA-ConfigCommon*. The network associates all possible preambles of an additional RACH configuration to one or more feature(s) or feature combination(s). The network does not configure this list to have more than 16 entries. If both *rach-ConfigCommon* and *msgA-ConfigCommon* are configured for a specific *FeatureCombination*, the network always provides them in the same *additionalRACH-Config*.

enableRA-PrioritizationForSlicing

Indicates whether or not the *ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep* should override the *ra-PrioritizationForAccessIdentity*. The field is applicable only when the UE is configured by upper layers with both NSAG and Access Identity 1 or 2. If value *TRUE* is configured, the UE should only apply the *ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep*. If value *FALSE* is configured, the UE should only apply *ra-PrioritizationForAccessIdentity*. If the field is absent, whether to use *ra-PrioritizationForSlicingTwoStep* or *ra-PrioritizationForAccessIdentity* is up to UE implementation.

mcs-Msg3-Repetitions

Configuration of eight candidate MCS indexes for PUSCH transmission scheduled by RAR UL grant and DCI format 0_0 with CRC scrambled by TC-RNTI. Only the first 4 configured or default MCS indexes are used for PUSCH transmission scheduled by RAR UL grant. This field is only applicable when the UE selects Random Access resources indicating Msg3 repetition in this BWP. If this field is absent when the set(s) of Random Access resources with MSG3 repetition indication are configured in the *BWP-UplinkCommon*, the UE shall apply the values {0, 1, 2, 3, 4, 5, 6, 7} (see TS 38.214 [19], clause 6.1.4).

msgA-ConfigCommon

Configuration of the cell specific PRACH and PUSCH resource parameters for transmission of MsgA in 2-step random access type procedure. The NW can configure msgA-ConfigCommon only for UL BWPs if the linked DL BWPs (same bwp-Id as UL-BWP) are the initial DL BWPs or DL BWPs containing the SSB associated to the initial BL BWP

numberOfMsg3-RepetitionsList

The number of repetitions for PUSCH transmission scheduled by RAR UL grant and DCI format 0_0 with CRC scrambled by TC-RNTI. This field is only applicable when the UE selects Random Access resources indicating Msg3 repetition in this BWP. If this field is absent when the set(s) of Random Access resources with MSG3 repetition indication are configured in the BWP-UplinkCommon, the UE shall apply the values {n1, n2, n3, n4} (see TS 38.214 [19], clause 6.1.2.1).

pucch-ConfigCommon

Cell specific parameters for the PUCCH of this BWP.

pusch-ConfigCommon

Cell specific parameters for the PUSCH of this BWP.

rach-ConfigCommon

Configuration of cell specific random access parameters which the UE uses for contention based and contention free random access as well as for contention based beam failure recovery in this BWP. The NW configures SSB-based RA (and hence *RACH-ConfigCommon*) only for UL BWPs if the linked DL BWPs (same *bwp-Id* as UL-BWP) are the initial DL BWPs or DL BWPs containing the SSB associated to the initial DL BWP or for RedCap UEs DL BWPs associated with *nonCellDefiningSSB* or the RedCap-specific initial downlink BWP. The network configures *rach-ConfigCommon*, whenever it configures contention free random access (for reconfiguration with sync or for beam failure recovery).

rach-ConfigCommonIAB

Configuration of cell specific random access parameters for the IAB-MT. The IAB specific IAB RACH configuration is used by IAB-MT, if configured.

rsrp-ThresholdMsg3

Threshold used by the UE for determining whether to select resources indicating Msg3 repetition in this BWP, as specified in TS 38.321 [3]. The field is mandatory if both set(s) of Random Access resources with MSG3 repetition indication and set(s) of Random Access resources without MSG3 repetition indication are configured in the BWP. It is absent otherwise.

useInterlacePUCCH-PUSCH

If the field is present, the UE uses uplink frequency domain resource allocation Type 2 for cell-specific PUSCH, e.g., PUSCH scheduled by RAR UL grant (see TS 38.213 [13] clause 8.3 and TS 38.214 [19], clause 6.1.2.2) and uses interlaced PUCCH Format 0 and 1 for cell-specific PUCCH (see TS 38.213 [13], clause 9.2.1).

Conditional Presence	Explanation
Msg3Rep	This field is optionally present, Need S, if the set(s) of Random Access resources with MSG3 repetition indication are
	configured in the BWP-UplinkCommon. It is absent otherwise.
RA-PrioSliceAl	The field is optionally present in SIB1, Need R, if both parameters ra-PrioritizationForAccessIdentity and the ra-
	PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep are present in SIB1. It is absent otherwise.
SpCellOnly2	The field is optionally present, Need M, in the BWP-UplinkCommon of an SpCell. It is absent otherwise.

BWP-UplinkDedicated

The IE BWP-UplinkDedicated is used to configure the dedicated (UE specific) parameters of an uplink BWP.

BWP-UplinkDedicated information element

```
-- ASN1START
-- TAG-BWP-UPLINKDEDICATED-START
BWP-UplinkDedicated ::=
                                    SEOUENCE {
    pucch-Config
                                        SetupRelease {
                                                      PUCCH-Config
                                                                                                               OPTIONAL,
                                                                                                                           -- Need M
   pusch-Config
                                        SetupRelease {
                                                      PUSCH-Config }
                                                                                                               OPTIONAL,
                                                                                                                           -- Need M
                                                      ConfiguredGrantConfig }
                                                                                                                           -- Need M
    configuredGrantConfig
                                        SetupRelease {
                                                                                                               OPTIONAL,
    srs-Config
                                       SetupRelease {
                                                      SRS-Config }
                                                                                                               OPTIONAL,
                                                                                                                           -- Need M
    beamFailureRecoveryConfig
                                                      BeamFailureRecoveryConfig }
                                        SetupRelease {
                                                                                                               OPTIONAL,
                                                                                                                           -- Cond SpCellOnly
    ] ]
                                        SetupRelease { PUCCH-Config }
    sl-PUCCH-Config-r16
                                                                                                               OPTIONAL,
                                                                                                                           -- Need M
    cp-ExtensionC2-r16
                                       INTEGER (1..28)
                                                                                                               OPTIONAL,
                                                                                                                           -- Need R
                                                                                                                           -- Need R
    cp-ExtensionC3-r16
                                        INTEGER (1..28)
                                                                                                               OPTIONAL,
                                       ENUMERATED {enabled}
    useInterlacePUCCH-PUSCH-r16
                                                                                                               OPTIONAL,
                                                                                                                           -- Need R
    pucch-ConfigurationList-r16
                                        SetupRelease { PUCCH-ConfigurationList-r16 }
                                                                                                               OPTIONAL,
                                       SetupRelease { LBT-FailureRecoveryConfig-r16 }
    lbt-FailureRecoveryConfig-r16
                                                                                                               OPTIONAL,
                                                                                                                           -- Need M
                                                         ConfiguredGrantConfigToAddModList-r16
    configuredGrantConfigToAddModList-r16
                                                                                                               OPTIONAL,
                                                                                                                           -- Need N
    configuredGrantConfigToReleaseList-r16
                                                         ConfiguredGrantConfigToReleaseList-r16
                                                                                                                           -- Need N
                                                                                                               OPTIONAL,
                                                                                                                           -- Need R
    configuredGrantConfigType2DeactivationStateList-r16 ConfiguredGrantConfigType2DeactivationStateList-r16
                                                                                                               OPTIONAL
    ]],
    П
    ul-TCI-StateList-r17
                                        CHOICE {
       explicitlist
                                           SEOUENCE {
           ul-TCI-ToAddModList-r17
                                               SEQUENCE (SIZE (1..maxUL-TCI-r17)) OF TCI-UL-State-r17
                                                                                                               OPTIONAL,
                                                                                                                          -- Need N
           ul-TCI-ToReleaseList-r17
                                               SEQUENCE (SIZE (1..maxUL-TCI-r17)) OF TCI-UL-State-Id-r17
                                                                                                               OPTIONAL
                                                                                                                           -- Need N
       unifiedTCI-StateRef-r17
                                        ServingCellAndBWP-Id-r17
                                                                                                               OPTIONAL, -- Need R
                                                                                                               OPTIONAL, -- Cond NoTCI-PC
    ul-powerControl-r17
                                       Uplink-powerControlId-r17
    pucch-ConfigurationListMulticast1-r17 SetupRelease { PUCCH-ConfigurationList-r16 }
                                                                                                               OPTIONAL, -- Need M
    pucch-ConfigurationListMulticast2-r17 SetupRelease { PUCCH-ConfigurationList-r16 }
                                                                                                               OPTIONAL -- Need M
    ]],
    pucch-ConfigMulticast1-r17
                                        SetupRelease { PUCCH-Config }
                                                                                                               OPTIONAL, -- Need M
    pucch-ConfigMulticast2-r17
                                        SetupRelease { PUCCH-Config }
                                                                                                               OPTIONAL -- Need M
    11,
```

BWP-UplinkDedicated field descriptions

beamFailureRecoveryConfig

Configuration of beam failure recovery. If supplementaryUplink is present, the field is present only in one of the uplink carriers, either UL or SUL.

configuredGrantConfig

A Configured-Grant of type1 or type2. It may be configured for UL or SUL but in case of type1 not for both at a time. Except for reconfiguration with sync, the NW does not reconfigure configuredGrantConfig when there is an active configured uplink grant Type 2 (see TS 38.321 [3]). However, the NW may release the configuredGrantConfig at any time. Network can only configure configured grant in one BWP using either this field or configuredGrantConfigToAddModList.

configuredGrantConfigToAddModList

Indicates a list of one or more configured grant configurations to be added or modified for one BWP. Except for reconfiguration with sync, the NW does not reconfigure a Type 2 configured grant configuration when it is active (see TS 38.321 [3]). The network configures multiple CG configurations for one BWP with either all configurations or no configuration configured with *cg-RetransmissionTimer-r16*.

configuredGrantConfigToReleaseList

Indicates a list of one or more UL Configured Grant configurations to be released. The NW may release a configured grant configuration at any time.

configuredGrantConfigType2DeactivationStateList

Indicates a list of the deactivation states in which each state can be mapped to a single or multiple Configured Grant type 2 configurations to be deactivated when the corresponding deactivation DCI is received, see clause 7.3.1 in TS 38.212 [17] and clause 10.2 in TS 38.213 [13].

cp-ExtensionC2, cp-ExtensionC3

Configures the cyclic prefix (CP) extension (see TS 38.211 [16], clause 5.3.1). For 15 kHz SCS, {1...28} are valid for both *cp-ExtensionC2* and *cp-ExtensionC3*. For 30 kHz SCS, {1...28} are valid for *cp-ExtensionC2* and {2...28} are valid for *cp-ExtensionC3*. For 60 kHz SCS, {2...28} are valid for *cp-ExtensionC2* and {3...28} are valid for *cp-ExtensionC3*.

Ibt-FailureRecoveryConfig

Configures parameters used for detection of consistent uplink LBT failures for operation with shared spectrum channel access, as specified in TS 38.321 [3].

pathlossReferenceRSToAddModList

A list of Reference Signals (e.g. a CSI-RS config or a SS block) to be used for path loss estimation for PUSCH, PUCCH and SRS for unified TCI state operation. If *unifiedTCI-StateType* is not configured for the serving cell, no element in this list is configured.

pucch-Config

PUCCH configuration for one BWP of the normal UL or SUL of a serving cell. If the UE is configured with SUL, the network configures PUCCH only on the BWPs of one of the uplinks (normal UL or SUL). The network configures *PUCCH-Config* at least on non-initial BWP(s) for SpCell and PUCCH SCell. If supported by the UE, the network may configure at most one additional SCell of a cell group with *PUCCH-Config* (i.e. PUCCH SCell). If PUCCH cell switching is supported by the UE, the network may configure two TDD serving cells with *PUCCH-Config* within each PUCCH group. For supporting PUCCH cell switching in the PUCCH group with the SpCell, the TDD SpCell and one TDD SCell shall have *PUCCH-Config* on their normal UL. For supporting PUCCH cell switching in the PUCCH group with only SCells, two TDD SCells shall have *PUCCH-Config* on their normal UL.

In (NG)EN-DC and NE-DC, the NW configures at most one serving cell per frequency range with PUCCH. In (NG)EN-DC and NE-DC, if two PUCCH groups are configured, the serving cells of the NR PUCCH group in FR2 use the same numerology. For NR-DC, the maximum number of PUCCH groups in each cell group is one, and only the same numerology is supported for the cell group with carriers only in FR2.

The NW may configure PUCCH for a BWP when setting up the BWP. The network may also add/remove the *pucch-Config* in an *RRCReconfiguration* with reconfigurationWithSync (for SpCell or PUCCH SCell) or with SCell release and add (for PUCCH SCell) to move the PUCCH between the UL and SUL carrier of one serving cell. In other cases, only modifications of a previously configured *pucch-Config* are allowed.

If one (S)UL BWP of a serving cell is configured with PUCCH, all other (S)UL BWPs must be configured with PUCCH, too.

pucch-ConfigurationList

PUCCH configurations for two simultaneously constructed HARQ-ACK codebooks (see TS 38.213 [13], clause 9.1). Different PUCCH Resource IDs are configured in different PUCCH-Config within the pucch-ConfigurationList if configured.

pucch-ConfigurationListMulticast1

PUCCH configurations for two simultaneously constructed HARQ-ACK codebooks for MBS multicast (see TS 38.213, clause 9).

pucch-ConfigurationListMulticast2

PUCCH configurations for two simultaneously constructed NACK-only feedback for MBS multicast (see TS 38.213, clause 9).

pusch-Config

PUSCH configuration for one BWP of the normal UL or SUL of a serving cell. If the UE is configured with SUL and if it has a *PUSCH-Config* for both UL and SUL, an UL/SUL indicator field in DCI indicates which of the two to use. See TS 38.212 [17], clause 7.3.1.

pucch-ConfigMulticast1

PUCCH configuration for the HARQ-ACK codebook for MBS multicast when multicast feedback is not configured with a priority value (see TS 38.213 [13], clause 9). If the field is not configured, *pucch-Config* applies.

pucch-ConfigMulticast2

PUCCH configuration for the NACK-only feedback for MBS multicast when multicast feedback is not configured with a priority value (see TS 38.213 [13], clause 9). If the field is not configured, pucch-Config applies.

sI-PUCCH-Config

Indicates the UE specific PUCCH configurations used for the HARQ-ACK feedback reporting for NR sidelink communication.

srs-Config

Uplink sounding reference signal configuration.

ul-powerControl

Configures power control parameters for PUCCH, PUSCH and SRS when UE is configured with *unifiedTCI-StateType* for this serving cell. For each serving cell, *ul-powerControl* is either configured in all *BWP-UplinkDedicated* or it is not configured in any *BWP-UplinkDedicated*. When *unifiedTCI-StateRef* in the *BWP-UplinkDedicated* of a serving cell refers to another serving cell, *ul-powerControl* is either configured in all *BWP-UplinkDedicated* of these two serving cells or it is not configured in any *BWP-UplinkDedicated* of these two serving cells.

ul-TCI-StateList

Indicates the applicable UL TCI states for PUCCH, PUSCH and SRS.

ul-TCI-ToAddModList

Indicates a list of UL TCI states.

unifiedTCI-StateRef

Provides the serving cell and UL BWP where UL TCI states applicable to this UL BWP are defined.

useInterlacePUCCH-PUSCH

If the field is present, the UE uses uplink frequency domain resource allocation Type 2 for PUSCH (see TS 38.213 [13], clause 8.3 and TS 38.214 [19], clause 6.1.2.2) and uses interlaced PUCCH Format 0, 1, 2, and 3 for PUCCH (see TS 38.213 [13], clause 9.2.1).

Conditional Presence	Explanation
NoTCI-PC	The field is optionally present, Need R, if unifiedTCI-StateType is configured for this serving cell and ul-powerControl is not
	configured for any UL TCI state or joint TCI state of this serving cell. Otherwise it is absent, Need R
SpCellOnly	The field is optionally present, Need M, in the BWP-UplinkDedicated of an SpCell. It is absent otherwise.

NOTE 1: In case of *RRCReconfiguration* with *reconfigurationWithSync*, the UE performs a MAC reset, which involves releasing the PUCCH-CSI/SRS/SR configuration in accordance with clause 5.3.12 and TS 38.321 [3], clauses 5.12 and 5.2. Hence, for these parts of the dedicated radio resource configuration, delta signalling is not supported in the message when *reconfigurationWithSync* is included.

CandidateBeamRS

The IE CandidateBeamRS inlcudes candidate beams for beam failure recovery in case of beam failure detection. See also TS 38.321 [3], clause 5.17.

CandidateBeamRS information element

```
-- ASN1START
-- TAG-CANDIDATEBEAMRS-START

CandidateBeamRS-r16 ::= SEQUENCE {
    candidateBeamConfig-r16 CHOICE {
        ssb-r16 SSB-Index,
        csi-RS-r16 NZP-CSI-RS-ResourceId
    }, servingCellId ServCellIndex OPTIONAL -- Need R
}

-- TAG-CANDIDATEBEAMRS-STOP
```

CandidateBeamRS field descriptions

candidateBeamConfig

Indicates the resource (i.e. SSB or CSI-RS) defining this beam resource.

servingCellId

-- ASN1STOP

If the field is absent, the RS belongs to the serving cell in which BeamFailureRecoveryRSConfig is configured.

CellAccessRelatedInfo

The IE CellAccessRelatedInfo indicates cell access related information for this cell.

CellAccessRelatedInfo information element

```
-- ASN1START
-- TAG-CELLACCESSRELATEDINFO-START
CellAccessRelatedInfo ::=
                                   SEQUENCE {
    plmn-IdentityInfoList
                                       PLMN-IdentityInfoList,
    cellReservedForOtherUse
                                       ENUMERATED {true}
                                                                     OPTIONAL, -- Need R
    . . . ,
    cellReservedForFutureUse-r16
                                       ENUMERATED {true}
                                                                     OPTIONAL,
                                                                                 -- Need R
    npn-IdentityInfoList-r16
                                       NPN-IdentityInfoList-r16
                                                                     OPTIONAL
                                                                                 -- Need R
    ]],
    snpn-AccessInfoList-r17
                                       SEQUENCE (SIZE (1..maxNPN-r16)) OF SNPN-AccessInfo-r17
                                                                                                 OPTIONAL
                                                                                                            -- Need R
    ]]
SNPN-AccessInfo-r17 ::=
                               SEQUENCE {
    extCH-Supported-r17
                                       ENUMERATED {true}
                                                                     OPTIONAL, -- Need R
    extCH-WithoutConfigAllowed-r17
                                       ENUMERATED {true}
                                                                     OPTIONAL, -- Need R
```

CellAccessRelatedInfo field descriptions

cellReservedForFutureUse

Indicates whether the cell is reserved, as defined in 38.304 [20] for future use. The field is applicable to all PLMNs and NPNs. This field is ignored by IAB-MT.

cellReservedForOtherUse

Indicates whether the cell is reserved, as defined in 38.304 [20]. The field is applicable to all PLMNs. This field is ignored by IAB-MT for cell barring determination, but still considered by NPN capable IAB-MT for determination of an NPN-only cell.

npn-IdentityInfoList

The *npn-IdentityInfoList* is used to configure a set of *NPN-IdentityInfo* elements. Each of those elements contains a list of one or more NPN Identities and additional information associated with those NPNs. The total number of PLMNs (identified by a PLMN identity in *plmn -IdentityList*), PNI-NPNs (identified by a PLMN identity and a CAG-ID), and SNPNs (identified by a PLMN identity and a NID) together in the *PLMN-IdentityInfoList* and *NPN-IdentityInfoList* does not exceed 12, except for the NPN-only cells. A PNI-NPN and SNPN can be included only once, and in only one entry of the *NPN-IdentityInfoList*. In case of NPN-only cells the *PLMN-IdentityList* contains a single element that does not count to the limit of 12 and the *cellIdentity* of the first entry of the *PLMN-IdentityInfoList* is set to the same value as the *cellIdentity-r16* of the first entry of the *NPN-IdentityInfoList*. The NPN index is defined as B+c1+c2+...+c(n-1)+d1+d2+...+d(m-1)+e(i) for the NPN identity included in the *n*-th entry of *NPN-IdentityInfoList* and in the *m*-th entry of *npn-IdentityInfoList* within that *NPN-IdentityInfoList* entry, and the *i*-th entry of its corresponding *NPN-Identity*, where

- B is the index used for the last PLMN in the PLMN-IdentittyInfoList, in NPN-only cells B is considered 0;
- c(j) is the number of NPN index values used in the j-th NPN-IdentityInfoList entry;
- d(k) is the number of NPN index values used in the k-th npn-IdentityList entry within the n-th NPN-IdentityInfoList entry;
- e(i) is
 - *i* if the *n*-th entry of *NPN-IdentityInfoList* entry is for SNPN(s);
 - 1 if the *n*-th entry of *NPN-IdentityInfoList* entry is for PNI-NPN(s).

plmn-IdentityInfoList

The *plmn-IdentityInfoList* is used to configure a set of *PLMN-IdentityInfo* elements. Each of those elements contains a list of one or more PLMN Identities and additional information associated with those PLMNs. A PLMN-identity can be included only once, and in only one entry of the *PLMN-IdentityInfoList*. The PLMN index is defined as b1+b2+...+b(n-1)+i for the PLMN included at the *n*-th entry of *PLMN-IdentityInfoList* and the *i*-th entry of its corresponding *PLMN-IdentityInfo*, where b(j) is the number of *PLMN-IdentityInfo*, respectively.

snpn-AccessInfoList

This list provides access related information for each SNPN in *npn-IdentityInfoList*, see TS 23.501 [32]. The n-th entry of the list contains the access related information of the n-th SNPN in *npn-IdentityInfoList*.

SNPN-AccessInfo field descriptions

extCH-Supported

Indicates whether the SNPN supports access using credentials from a Credentials Holder as specified in TS 23.501 [32].

extCH-WithoutConfigAllowed

Indicates whether the SNPN allows registration attempts with credentials from a Credentials Holder from UEs that are not explicitly configured to select the SNPN as specified in TS 23.501 [32].

imsEmergencySupportForSNPN

Indicates whether the SNPN supports IMS emergency bearer services for UEs in limited service mode in the cell. If absent, IMS emergency call is not supported by the SNPN in the cell for UEs in limited service mode.

onboardingEnabled

Indicates whether the onboarding SNPN allows registration for onboarding in the cell as specified in TS 23.501 [32].

CellAccessRelatedInfo-EUTRA-5GC

The IE CellAccessRelatedInfo-EUTRA-5GC indicates cell access related information for an LTE cell connected to 5GC.

CellAccessRelatedInfo-EUTRA-5GC information element

```
-- ASN1START
-- TAG-CELLACCESSRELATEDINFOEUTRA-5GC-START
CellAccessRelatedInfo-EUTRA-5GC ::=
                                       SEOUENCE {
    plmn-IdentityList-eutra-5gc
                                           PLMN-IdentityList-EUTRA-5GC,
                                           TrackingAreaCode,
    trackingAreaCode-eutra-5gc
    ranac-5qc
                                           RAN-AreaCode
                                                                                       OPTIONAL,
    cellIdentity-eutra-5gc
                                           CellIdentity-EUTRA-5GC
PLMN-IdentityList-EUTRA-5GC::=
                                       SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity-EUTRA-5GC
PLMN-Identity-EUTRA-5GC ::=
                                       CHOICE {
    plmn-Identity-EUTRA-5GC
                                           PLMN-Identity,
    plmn-index
                                           INTEGER (1..maxPLMN)
                                       CHOICE {
CellIdentity-EUTRA-5GC ::=
    cellIdentity-EUTRA
                                           BIT STRING (SIZE (28)),
    cellId-index
                                           INTEGER (1..maxPLMN)
-- TAG-CELLACCESSRELATEDINFOEUTRA-5GC-STOP
-- ASN1STOP
```

CellAccessRelatedInfo-EUTRA-EPC

The IE CellAccessRelatedInfo-EUTRA-EPC indicates cell access related information for an LTE cell connected to EPC.

CellAccessRelatedInfo-EUTRA-EPC information element

```
-- ASN1START
-- TAG-CELLACCESSRELATEDINFOEUTRA-EPC-START

CellAccessRelatedInfo-EUTRA-EPC ::= SEQUENCE {
    plmn-IdentityList-eutra-epc
    trackingAreaCode-eutra-epc
    cellIdentity-eutra-epc
    BIT STRING (SIZE (16)),
    cellIdentityList-EUTRA-EPC::= SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity

-- TAG-CELLACCESSRELATEDINFOEUTRA-EPC-STOP
-- ASN1STOP
```

CellGroupConfig

The *CellGroupConfig* IE is used to configure a master cell group (MCG) or secondary cell group (SCG). A cell group comprises of one MAC entity, a set of logical channels with associated RLC entities and of a primary cell (SpCell) and one or more secondary cells (SCells).

CellGroupConfig information element

```
-- ASN1START
-- TAG-CELLGROUPCONFIG-START
-- Configuration of one Cell-Group:
CellGroupConfig ::=
                                          SEQUENCE {
    cellGroupId
                                              CellGroupId,
   rlc-BearerToAddModList
                                              SEQUENCE (SIZE(1..maxLC-ID)) OF RLC-BearerConfig
                                                                                                                      OPTIONAL,
                                                                                                                                 -- Need N
                                              SEQUENCE (SIZE(1..maxLC-ID)) OF LogicalChannelIdentity
                                                                                                                                 -- Need N
   rlc-BearerToReleaseList
                                                                                                                      OPTIONAL,
                                                                                                                                  -- Need M
    mac-CellGroupConfig
                                              MAC-CellGroupConfig
                                                                                                                      OPTIONAL,
    physicalCellGroupConfig
                                              PhysicalCellGroupConfig
                                                                                                                      OPTIONAL,
                                                                                                                                 -- Need M
    spCellConfig
                                              SpCellConfig
                                                                                                                      OPTIONAL,
                                                                                                                                 -- Need M
    sCellToAddModList
                                              SEQUENCE (SIZE (1..maxNrofSCells)) OF SCellConfig
                                                                                                                                  -- Need N
                                                                                                                      OPTIONAL,
    sCellToReleaseList
                                              SEQUENCE (SIZE (1..maxNrofSCells)) OF SCellIndex
                                                                                                                                  -- Need N
                                                                                                                      OPTIONAL,
    [ [
                                              ENUMERATED {true}
    reportUplinkTxDirectCurrent
                                                                                                                  OPTIONAL
                                                                                                                              -- Cond BWP-Reconfig
    ]],
    bap-Address-r16
                                              BIT STRING (SIZE (10))
                                                                                                                      OPTIONAL,
                                                                                                                                  -- Need M
    bh-RLC-ChannelToAddModList-r16
                                              SEQUENCE (SIZE(1..maxBH-RLC-ChannelID-r16)) OF BH-RLC-ChannelConfig-r16 OPTIONAL,
                                                                                                                                  -- Need N
                                              SEQUENCE (SIZE(1...maxBH-RLC-ChannelID-r16)) OF BH-RLC-ChannelID-r16
    bh-RLC-ChannelToReleaseList-r16
                                                                                                                      OPTIONAL,
                                                                                                                                 -- Need N
                                                                                                                      OPTIONAL, -- Need M
    flc-TransferPath-r16
                                              ENUMERATED {lte, nr, both}
                                              SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex
                                                                                                                                 -- Need R
    simultaneousTCI-UpdateList1-r16
                                                                                                                      OPTIONAL,
    simultaneousTCI-UpdateList2-r16
                                              SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex
                                                                                                                      OPTIONAL, -- Need R
    simultaneousSpatial-UpdatedList1-r16
                                              SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex
                                                                                                                      OPTIONAL, -- Need R
                                              SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex
    simultaneousSpatial-UpdatedList2-r16
                                                                                                                      OPTIONAL, -- Need R
    uplinkTxSwitchingOption-r16
                                              ENUMERATED {switchedUL, dualUL}
                                                                                                                      OPTIONAL,
                                                                                                                                 -- Need R
```

```
uplinkTxSwitchingPowerBoosting-r16
                                              ENUMERATED {enabled}
                                                                                                                      OPTIONAL
                                                                                                                                  -- Need R
    11.
    Π
    reportUplinkTxDirectCurrentTwoCarrier-r16 ENUMERATED {true}
                                                                                                                      OPTIONAL
                                                                                                                                  -- Need N
    11.
    ] ]
    flc-TransferPathNRDC-r17
                                              ENUMERATED {mcq, scq, both}
                                                                                                                      OPTIONAL,
                                                                                                                                  -- Need M
    uplinkTxSwitching-2T-Mode-r17
                                              ENUMERATED {enabled}
                                                                                                                      OPTIONAL,
                                                                                                                                  -- Cond 2Tx
    uplinkTxSwitching-DualUL-TxState-r17
                                              ENUMERATED {oneT, twoT}
                                                                                                                      OPTIONAL,
                                                                                                                                  -- Cond 2Tx
    uu-RelayRLC-ChannelToAddModList-r17
                                              SEQUENCE (SIZE(1..maxUu-RelayRLC-ChannelID-r17)) OF Uu-RelayRLC-ChannelConfig-r17
                                                                                                                      OPTIONAL,
                                                                                                                                  -- Need N
    uu-RelayRLC-ChannelToReleaseList-r17
                                              SEQUENCE (SIZE(1..maxUu-RelayRLC-ChannelID-r17)) OF Uu-RelayRLC-ChannelID-r17
                                                                                                                      OPTIONAL,
                                                                                                                                  -- Need N
    simultaneousU-TCI-UpdateList1-r17
                                              SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex
                                                                                                                      OPTIONAL.
                                                                                                                                 -- Need R
    simultaneousU-TCI-UpdateList2-r17
                                              SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex
                                                                                                                      OPTIONAL,
                                                                                                                                 -- Need R
    simultaneousU-TCI-UpdateList3-r17
                                              SEOUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex
                                                                                                                      OPTIONAL,
                                                                                                                                 -- Need R
    simultaneousU-TCI-UpdateList4-r17
                                              SEOUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex
                                                                                                                      OPTIONAL,
                                                                                                                                 -- Need R
    rlc-BearerToReleaseListExt-r17
                                              SEQUENCE (SIZE(1..maxLC-ID)) OF LogicalChannelIdentityExt-r17
                                                                                                                      OPTIONAL,
                                                                                                                                 -- Need N
    iab-ResourceConfigToAddModList-r17 SEOUENCE (SIZE(1..maxNrofIABResourceConfig-r17)) OF IAB-ResourceConfig-r17 OPTIONAL, -- Need N
    iab-ResourceConfigToReleaseList-r17 SEQUENCE (SIZE(1..maxNrofIABResourceConfig-r17)) OF IAB-ResourceConfigID-r17 OPTIONAL -- Need N
    11,
    11
    reportUplinkTxDirectCurrentMoreCarrier-r17 ReportUplinkTxDirectCurrentMoreCarrier-r17
                                                                                                                    OPTIONAL -- Need N
    11
-- Serving cell specific MAC and PHY parameters for a SpCell:
SpCellConfig ::=
                                       SEOUENCE {
    servCellIndex
                                       ServCellIndex
                                                                                                   OPTIONAL,
                                                                                                               -- Cond SCG
    reconfigurationWithSync
                                       ReconfigurationWithSync
                                                                                                               -- Cond ReconfWithSync
                                                                                                   OPTIONAL,
    rlf-TimersAndConstants
                                       SetupRelease { RLF-TimersAndConstants }
                                                                                                   OPTIONAL.
                                                                                                               -- Need M
    rlmInSyncOutOfSyncThreshold
                                       ENUMERATED {n1}
                                                                                                               -- Need S
                                                                                                   OPTIONAL,
    spCellConfigDedicated
                                       ServingCellConfig
                                                                                                   OPTIONAL,
                                                                                                               -- Need M
    11
    s-SearchDeltaP-Connected-r17
                                           ENUMERATED {dB3, dB6, dB9, dB12, dB15, spare3, spare2, spare1},
       t-SearchDeltaP-Connected-r17
                                           ENUMERATED {s5, s10, s20, s30, s60, s120, s180, s240, s300, spare7, spare6, spare5,
                                                       spare4, spare3, spare2, spare1}
                                                                                                   OPTIONAL,
                                                                                                               -- Need R
                                                                                                               -- Need R
    goodServingCellEvaluationRLM-r17
                                       GoodServingCellEvaluation-r17
                                                                                                   OPTIONAL,
    goodServingCellEvaluationBFD-r17
                                       GoodServingCellEvaluation-r17
                                                                                                   OPTIONAL,
                                                                                                               -- Need R
    deactivatedSCG-Config-r17
                                       SetupRelease { DeactivatedSCG-Config-r17 }
                                                                                                               -- Cond SCG-Opt
                                                                                                   OPTIONAL
    11
ReconfigurationWithSync ::=
                                    SEOUENCE
    spCellConfigCommon
                                       ServingCellConfigCommon
                                                                                                   OPTIONAL,
                                                                                                              -- Need M
    newUE-Identity
                                       RNTI-Value,
                                       ENUMERATED {ms50, ms100, ms150, ms200, ms500, ms1000, ms2000, ms10000},
    t.304
    rach-ConfigDedicated
                                       CHOICE {
       uplink
                                           RACH-ConfigDedicated,
        supplementaryUplink
                                           RACH-ConfigDedicated
                                                                                                   OPTIONAL,
                                                                                                             -- Need N
```

```
] ]
    smtc
                                        SSB-MTC
                                                                                                     OPTIONAL
                                                                                                                 -- Need S
    ]],
    daps-UplinkPowerConfig-r16
                                    DAPS-UplinkPowerConfig-r16
                                                                                                     OPTIONAL
                                                                                                                 -- Need N
    ]],
    11
    sl-PathSwitchConfig-r17
                                    SL-PathSwitchConfig-r17
                                                                                                     OPTIONAL
                                                                                                                 -- Cond DirectToIndirect-PathSwitch
    11
DAPS-UplinkPowerConfig-r16 ::=
                                    SEOUENCE {
    p-DAPS-Source-r16
                                        P-Max,
   p-DAPS-Target-r16
                                        P-Max,
    uplinkPowerSharingDAPS-Mode-r16
                                        ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic }
SCellConfig ::=
                                    SEOUENCE {
    sCellIndex
                                        SCellIndex,
    sCellConfigCommon
                                        ServingCellConfigCommon
                                                                                                     OPTIONAL.
                                                                                                                 -- Cond SCellAdd
    sCellConfigDedicated
                                        ServingCellConfig
                                                                                                                -- Cond SCellAddMod
                                                                                                     OPTIONAL,
    11
    smtc
                                        SSB-MTC
                                                                                                                 -- Need S
                                                                                                     OPTIONAL
    ]],
    ] ]
    sCellState-r16
                                    ENUMERATED {activated}
                                                                                                     OPTIONAL,
                                                                                                                 -- Cond SCellAddSync
    secondaryDRX-GroupConfig-r16
                                    ENUMERATED {true}
                                                                                                     OPTIONAL
                                                                                                                 -- Cond DRX-Config2
    11
    preConfGapStatus-r17
                                     BIT STRING (SIZE (maxNrofGapId-r17))
                                                                                                                 -- Cond PreConfigMG
                                                                                                     OPTIONAL,
    goodServingCellEvaluationBFD-r17 GoodServingCellEvaluation-r17
                                                                                                     OPTIONAL,
                                                                                                                 -- Need R
    sCellSIB20-r17
                                     SetupRelease { SCellSIB20-r17 }
                                                                                                     OPTIONAL
                                                                                                                 -- Need M
    11
SCellSIB20-r17 ::= OCTET STRING (CONTAINING SystemInformation)
DeactivatedSCG-Config-r17 ::=
                                    SEQUENCE {
   bfd-and-RLM-r17
                                        BOOLEAN,
    . . .
GoodServingCellEvaluation-r17 ::=
                                        SEQUENCE
    offset-r17
                                            ENUMERATED {db2, db4, db6, db8}
                                                                                                     OPTIONAL -- Need S
SL-PathSwitchConfig-r17 ::=
                                    SEOUENCE {
    targetRelayUE-Identity-r17
                                        SL-SourceIdentity-r17,
    t420-r17
                                        ENUMERATED {ms50, ms100, ms150, ms200, ms500, ms1000, ms2000, ms10000},
```

```
IAB-ResourceConfig-r17 ::=
                                   SEOUENCE {
    iab-ResourceConfigID-r17
                                       IAB-ResourceConfigID-r17,
    slotList-r17
                                       SEQUENCE (SIZE (1..5120)) OF INTEGER (0..5119)
                                                                                                                 OPTIONAL,
                                                                                                                             -- Need M
    periodicitySlotList-r17
                                       ENUMERATED {ms0p5, ms0p625, ms1, ms1p25, ms2, ms2p5, ms5, ms10, ms20, ms40, ms80, ms160}
                                                                                                                                     OPTIONAL.
- Need M
    slotListSubcarrierSpacing-r17
                                       SubcarrierSpacing
                                                                                                                 OPTIONAL.
                                                                                                                             -- Need M
IAB-ResourceConfigID-r17 ::=
                                   INTEGER(0..maxNrofIABResourceConfig-1-r17)
ReportUplinkTxDirectCurrentMoreCarrier-r17 ::= SEQUENCE (SIZE(1.. maxSimultaneousBands)) OF IntraBandCC-CombinationReqList-r17
IntraBandCC-CombinationReqList-r17::= SEQUENCE {
    servCellIndexList-r17
                                            SEQUENCE (SIZE(1.. maxNrofServingCells)) OF ServCellIndex,
    cc-CombinationList-r17
                                            SEQUENCE (SIZE(1.. maxNrofRegComDC-Location-r17)) OF IntraBandCC-Combination-r17
IntraBandCC-Combination-r17::=
                                   SEQUENCE (SIZE(1.. maxNrofServingCells)) OF CC-State-r17
CC-State-r17::=
                                    SEQUENCE {
   dlCarrier-r17
                                       CarrierState-r17
                                                                                     OPTIONAL, -- Need N
    ulCarrier-r17
                                       CarrierState-r17
                                                                                     OPTIONAL -- Need N
CarrierState-r17::=
                                    CHOICE {
    deActivated-r17
                                       NULL,
    activeBWP-r17
                                       INTEGER (0..maxNrofBWPs)
-- TAG-CELLGROUPCONFIG-STOP
-- ASN1STOP
```

CC-State field descriptions

dlCarrier

Indicates DL carrier activation state for this carrier and the related active BWP Index, if activated.

ulCarrier

Indicates UL carrier activation state for this carrier and the related active BWP Index, if activated.

CellGroupConfig field descriptions

bap-Address

BAP address of the parent node in cell group.

bh-RLC-ChannelToAddModList

Configuration of the backhaul RLC entities and the corresponding MAC Logical Channels to be added and modified.

bh-RLC-ChannelToReleaseList

List of the backhaul RLC entities and the corresponding MAC Logical Channels to be released.

f1c-TransferPath

The F1-C transfer path that an EN-DC IAB-MT should use for transferring F1-C packets to the IAB-donor-CU. If IAB-MT is configured with *Ite*, IAB-MT can only use LTE leg for F1-C transfer. If IAB-MT is configured with *nr*, IAB-MT can only use NR leg for F1-C transfer. If IAB-MT is configured with *both*, it is up to IAB-MT to select an LTE leg or a NR leg for F1-C transfer. If the field is not configured, the IAB node uses the NR leg as the default one.

f1c-TransferPathNRDC

The F1-C transfer path that an NR-DC IAB-MT should use for transferring F1-C packets to the IAB-donor-CU. If IAB-MT is configured with *mcg*, IAB-MT can only use the MCG for F1-C transfer. If IAB-MT is configured with *both*, it is up to IAB-MT to select the MCG or the SCG for F1-C transfer.

mac-CellGroupConfig

MAC parameters applicable for the entire cell group.

rlc-BearerToAddModList

Configuration of the MAC Logical Channel, the corresponding RLC entities and association with radio bearers.

reportUplinkTxDirectCurrent

Enables reporting of uplink and supplementary uplink Direct Current location information upon BWP configuration and reconfiguration. This field is only present when the BWP configuration is modified or any serving cell is added or removed. This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message. If UE is configured with SUL carrier, UE reports both UL and SUL Direct Current locations.

reportUplinkTxDirectCurrentMoreCarrier

Enables reporting of uplink Direct Current location information when the UE is configured with intra-band CA. This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message. The UE only reports the uplink Direct Current location information that are related to the indicated *cc-CombinationList*. The network does not include carriers which locate in DL only spectrum described in TS 38.101-2 [39], clause 5.3A.4 and defined by Fsd according to Table 5.3A.4-3 in FR2 in the *IntraBandCC-CombinationRegList*. I.e. DL-only carrier in FR2 frequency spectrum is not used to calculate the default DC location.

reportUplinkTxDirectCurrentTwoCarrier

Enables reporting of uplink Direct Current location information when the UE is configured with uplink intra-band CA with two carriers. This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message.

rlc-BearerToReleaseListExt

List of the RLC entities and the corresponding MAC Logical Channels to be released for multicast MRBs.

rlmInSyncOutOfSyncThreshold

BLER threshold pair index for IS/OOS indication generation, see TS 38.133 [14], table 8.1.1-1. *n1* corresponds to the value 1. When the field is absent, the UE applies the value 0. Whenever this is reconfigured, UE resets N310 and N311, and stops T310, if running. Network does not include this field.

sCellSIB20

This field is used to transfer SIB20 of the SCell in order to allow the UE for MBS broadcast reception on SCell. The network configures this field only for a single SCell at a time.

sCellState

Indicates whether the SCell shall be considered to be in activated state upon SCell configuration. If the field is included for an SCell configured with TRS for fast activation of the SCell, such TRS is not used for the corresponding SCell.

sCellToAddModList

List of secondary serving cells (SCells) to be added or modified.

sCellToReleaseList

List of secondary serving cells (SCells) to be released.

secondaryDRX-GroupConfig

The field is used to indicate whether the SCell belongs to the secondary DRX group. All serving cells in the secondary DRX group shall belong to one Frequency Range and all serving cells in the legacy DRX group shall belong to another Frequency Range.

simultaneousSpatial-UpdatedList1, simultaneousSpatial-UpdatedList2

List of serving cells which can be updated simultaneously for spatial relation with a MAC CE. The simultaneous Spatial-Updated List 1 and simultaneous Spatial-Updated List 2 shall not contain same serving cells. Network should not configure serving cells that are configured with a BWP with two different values for the coreset PoolIndex in these lists.

simultaneousTCI-UpdateList1. simultaneousTCI-UpdateList2

List of serving cells which can be updated simultaneously for TCI relation with a MAC CE. The *simultaneousTCI-UpdateList1* and *simultaneousTCI-UpdateList2* shall not contain same serving cells. Network should not configure serving cells that are configured with a BWP with two different values for the *coresetPoolIndex* in these lists.

simultaneousU-TCI-UpdateList1, simultaneousU-TCI-UpdateList2, simultaneousU-TCI-UpdateList3, simultaneousU-TCI-UpdateList4

List of serving cells for which the Unified TCI States Activation/Deactivation MAC CE applies simultaneously, as specified in TS 38.321 [3] clause 6.1.3.47. The different lists shall not contain same serving cells. Network only configures in these lists serving cells that are configured with *unifiedTCI-StateType*.

spCellConfig

Parameters for the SpCell of this cell group (PCell of MCG or PSCell of SCG).

uplinkTxSwitchingOption

Indicates which option is configured for dynamic UL Tx switching for inter-band UL CA or (NG)EN-DC. The field is set to *switchedUL* if network configures option 1 as specified in TS 38.214 [19], or *dualUL* if network configures option 2 as specified in TS 38.214 [19]. Network always configures UE with a value for this field in inter-band UL CA case and (NG)EN-DC case where UE supports dynamic UL Tx switching.

uplinkTxSwitchingPowerBoosting

Indicates whether the UE is allowed to enable 3dB boosting on the maximum output power for transmission on carrier2 under the operation state in which 2-port transmission can be supported on carrier2 for inter-band UL CA case with dynamic UL Tx switching as defined in TS 38.101-1 [15]. Network can only configure this field for dynamic UL Tx switching in inter-band UL CA case with power Class 3 as defined in TS 38.101-1 [15].

uplinkTxSwitching-2T-Mode

Indicates 2Tx-2Tx switching mode is configured for inter-band UL CA or SUL, in which the switching gap duration for a triggered uplink switching (as specified in TS 38.214 [19]) is equal to the switching time capability value reported for the switching mode.

If this field is absent and *uplinkTxSwitching* is configured, it is interpreted that 1Tx-2Tx UL Tx switching is configured as specified in TS 38.214 [19]. In this case, there is one uplink (or one uplink band in case of intra-band) configured with *uplinkTxSwitching*, on which the maximum number of antenna ports among all configured P-SRS/A-SRS and activated SP-SRS resources should be 1 and non-codebook based UL MIMO is not configured.

uplinkTxSwitching-DualUL-TxState

Indicates the state of Tx chains if the state of Tx chains after the UL Tx switching is not unique (as specified in TS 38.214 [19]) in case of 2Tx-2Tx switching is configured and *uplinkTxSwitchingOption* is set to *dualUL*. Value *oneT* indicates 1Tx is assumed to be supported on the carriers on each band, value *twoT* indicates 2Tx is assumed to be supported on that carrier.

uu-RelavRLC-ChannelToAddModList

List of the Uu RLC entities and the corresponding MAC Logical Channels to be added or modified.

uu-RelavRLC-ChannelToReleaseList

List of the Uu RLC entities and the corresponding MAC Logical Channels to be released.

DeactivatedSCG-Config field descriptions

bfd-and-RLM

If the field is set to *true*, the UE shall perform RLM and BFD on the PSCell when the SCG is deactivated and the network ensures that *beamFailure* is not configured in the *radioLinkMonitoringConfig* of the DL BWP of the PSCell in which the UE performs BFD. If set to *false*, the UE is not required to perform RLM and BFD on the PSCell when the SCG is deactivated.

DAPS-UplinkPowerConfig field descriptions

p-DAPS-Source

The maximum total transmit power to be used by the UE in the source cell group during DAPS handover.

p-DAPS-Target

The maximum total transmit power to be used by the UE in the target cell group during DAPS handover.

uplinkPowerSharingDAPS-Mode

Indicates the uplink power sharing mode that the UE uses in DAPS handover (see TS 38.213 [13]).

GoodServingCellEvaluation field descriptions

offset

The parameter "X" (dB) for the good serving cell quality criterion in RRC_CONNECTED, for a cell operating in FR1 and FR2, respectively. If this field is absent, the UE applies the (default) value of 0 dB for "X".

IAB-ResourceConfig field descriptions

iab-ResourceConfigID

This ID is used to indicate the specific resource configuration addressed by the MAC CEs specified in TS 38.321 [3].

periodicitySlotList

Indicates the periodicity in ms of the list of slot indexes indicated in slotList.

slotList

Indicates the list of slot indexes to which the information indicated in the specific MAC CE applies to, as specified in TS 38.321 [3]. The values of the entries in the slotList are strictly less than the value of the periodicitySlotList.

slotListSubcarrierSpacing

Subcarrier spacing used as reference for the *slotList* configuration.

Only the following values are applicable depending on the used frequency:

FR1: 15 or 30 kHz FR2-1: 60 or 120 kHz FR2-2: 120 or 480 kHz

ReconfigurationWithSync field descriptions

rach-ConfigDedicated

Random access configuration to be used for the reconfiguration with sync (e.g. handover). The UE performs the RA according to these parameters in the firstActiveUplinkBWP (see UplinkConfig).

smtc

The SSB periodicity/offset/duration configuration of target cell for NR PSCell change and NR PCell change. The network sets the *periodicityAndOffset* to indicate the same periodicity as *ssb-periodicityServingCell* in *spCellConfigCommon* or sets to the same periodicity as *ssb-Periodicity-r17* in *nonCellDefiningSSB-r17* if the first active DL BWP included in this RRC message is configured with *nonCellDefiningSSB-r17* for RedCap.

For case of NR PCell change, the *smtc* is based on the timing reference of (source) PCell. For case of NR PSCell change, it is based on the timing reference of source PSCell. If both this field and *targetCellSMTC-SCG* are absent, the UE uses the SMTC in the *measObjectNR* having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message. For a RedCap UE, if the first active DL BWP included in this RRC message is configured with *nonCellDefiningSSB-r17*, this field corresponds to the NCD-SSB indicated by *nonCellDefiningSSB-r17*, otherwise, this field corresponds to the CD-SSB indicated by *absoluteFrequencySSB* in *frequencyInfoDL*.

ReportUplinkTxDirectCurrentMoreCarrier field descriptions

IntraBandCC-Combination

Indicates the state of the carriers and BWPs indexes of the carriers in a CC combination, each carrier in this combination corresponds to an entry in servCellIndexList with same order. This IE shall have the same size as servCellIndexList.

IntraBandCC-CombinationRegList

Indicates the list of the requested carriers/BWPs combinations for an intra-band CA component.

servCellIndexList

indicates the list of cell index for an intra-band CA component.

SCellConfig field descriptions

goodServingCellEvaluationBFD

Indicates the criterion for a UE to detect the good serving cell quality for BFD relaxation in an SCell in RRC_CONNECTED. This field is always configured when the network enables BFD relaxation for the UE in this SCell. This field is absent if *failureDetectionSetN* is present for the SCell.

preConfGapStatus

Indicates whether the pre-configured measurement gaps (i.e. the gaps configured with *preConfigInd*) are activated or deactivated while this SCell is deactivated. If this field is configured, the UE shall apply network-controlled mechanism for activation and deactivation of the pre-configured measurement gaps, otherwise the UE shall apply the autonomous activation/deactivation mechanism, as specified in TS 38.133 [14]. The first/leftmost bit corresponds to the measurement gap with gap ID 1, the second bit corresponds to measurement gap with gap ID 2, and so on. Value 0 indicates that the corresponding pre-configured measurement gap is deactivated while value 1 indicates that the corresponding pre-configured measurement gap is not a pre-configured measurement gap.

smtc

The SSB periodicity/offset/duration configuration of target cell for NR SCell addition. The network sets the *periodicityAndOffset* to indicate the same periodicity as *ssb-periodicityServingCell* in *sCellConfigCommon*. The *smtc* is based on the timing of the SpCell of associated cell group. In case of inter-RAT handover to NR, the timing reference is the NR PCell. In case of intra-NR PCell change (standalone NR) or NR PSCell change (EN-DC), the timing reference is the target SpCell. If the field is absent, the UE uses the SMTC in the *measObjectNR* having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message.

SpCellConfig field descriptions

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deactivatedSCG-Config

Configuration applicable when the SCG is deactivated. The network always configures this field before or when indicating that the SCG is deactivated in an RRCReconfiguration, RRCResume, E-UTRA RRCConnectionReconfiguration or E-UTRA RRCConnectionReconfiguration.

goodServingCellEvaluationBFD

Indicates the criterion for a UE to detect the good serving cell quality for BFD relaxation in the SpCell in RRC_CONNECTED. The field is always configured when the network enables BFD relaxation for the UE in this SpCell. This field is absent if *failureDetectionSetN* is present for the SpCell.

goodServingCellEvaluationRLM

Indicates the criterion for a UE to detect the good serving cell quality for RLM relaxation in the SpCell in RRC_CONNECTED. The field is always configured when the network enables RLM relaxation for the UE in this SpCell.

IowMobilityEvaluationConnected

Indicates the criterion for a UE to detect low mobility in RRC_CONNECTED in an SpCell. The *s-SearchDeltaP-Connected* is the parameter "S_{SearchDeltaP-connected}". Value *dB*3 corresponds to 3 dB, *dB*6 corresponds to 6 dB and so on. The *t-SearchDeltaP-Connected* is the parameter "T_{SearchDeltaP-Connected}". Value *s5* means 5 seconds, value *s10* means 10 seconds and so on. Low mobility criterion is configured in NR PCell for the case of NR SA/ NR CA/ NE-DC/NR-DC, and in the NR PSCell for the case of EN-DC.

reconfigurationWithSync

Parameters for the synchronous reconfiguration to the target SpCell.

rlf-TimersAndConstants

Timers and constants for detecting and triggering cell-level radio link failure. For the SCG, rlf-TimersAndConstants can only be set to setup and is always included at SCG addition.

servCellIndex

Serving cell ID of a PSCell. The PCell of the Master Cell Group uses ID = 0.

SL-PathSwitchConfig field descriptions

targetRelayUE-Identity

Indicates the L2 source ID of the target L2 U2N Relay UE during path switch.

T420

Indicates the timer value of T420 to be used during path switch.

Conditional Presence	Explanation
2Tx	The field is optionally present, Need R, if <i>uplinkTxSwitching</i> is configured; otherwise it is absent, Need R.
BWP-Reconfig	The field is optionally present, Need N, if the BWPs are reconfigured or if serving cells are added or removed. Otherwise it is
	absent.
DirectToIndirect-PathSwitch	The field is mandatory present for the L2 U2N remote UE at path switch to the target L2 U2N Relay UE. It is absent
	otherwise.
DRX-Config2	The field is optionally present, Need N, if drx-ConfigSecondaryGroup is configured. It is absent otherwise.
PreConfigMG	The field is optionally present, Need R, if there is at least one per UE gap configured with preConfiglnd or there is at least
	one per FR gap of the same FR which the SCell belongs to and configured with preConfigInd. It is absent, Need R,
	otherwise.
ReconfWithSync	The field is mandatory present in the RRCReconfiguration message:
	- in each configured <i>CellGroupConfig</i> for which the SpCell changes,
	- in the <i>masterCellGroup:</i>
	- at change of AS security key derived from K _{gNB} ,
	 in an RRCReconfiguration message contained in a DLInformationTransferMRDC message,
	 path switch of L2 U2N remote UE to the target PCell,
	 path switch of L2 U2N remote UE to the target L2 U2N Relay UE,
	- in the secondaryCellGroup at:
	- PSCell addition,
	- SCG resume with NR-DC or (NG)EN-DC,
	- update of required SI for PSCell,
	- change of AS security key derived from S-K _{9NB} in NR-DC while the UE is configured with at least one radio bearer
	with keyToUse set to secondary and that is not released by this RRCReconfiguration message,
	- MN handover in (NG)EN-DC.
	Otherwise, it is optionally present, need M. The field is absent in the masterCellGroup in RRCResume and RRCSetup
	messages and is absent in the masterCellGroup in RRCReconfiguration messages if source configuration is not released
	during DAPS handover.
SCellAdd	The field is mandatory present upon SCell addition; otherwise it is absent, Need M.
SCellAddMod	The field is mandatory present upon SCell addition; otherwise it is optionally present, need M.
SCellAddSync	The field is optionally present, Need N:
	- in the <i>masterCellGroup</i> at
	- SCell addition,
	 reconfiguration with sync, resume of an RRC connection.
	 in the secondaryCellGroup, when the SCG is not indicated as deactivated at: SCG activation while the SCG was previously deactivated,
	- SCG activation while the SCG was previously deactivated, - SCell addition,
	- Scen addition, - reconfiguration with sync.
	It is absent otherwise.
SCG	The field is mandatory present in an <i>SpCellConfig</i> for the PSCell. It is absent otherwise.
SCG-Opt	The field is mandatory present in an SpCellConfig for the PSCell. It is absent otherwise. The field is optionally present, Need M, in an SpCellConfig for the PSCell. It is absent otherwise.
σοσ-ορι	The held is optionally present, need by, in an spoeholing for the rocell. It is absent otherwise.

NOTE: In case of change of AS security key derived from S-K_{gNB}/S-K_{eNB}, if *reconfigurationWithSync* is not included in the *masterCellGroup*, the network releases all existing MCG RLC bearers associated with a radio bearer with *keyToUse* set to *secondary*. In case of change of AS security key derived from K_{gNB}/K_{eNB}, if *reconfigurationWithSync* is not included in the *secondaryCellGroup*, the network releases all existing SCG RLC bearers associated with a radio bearer with

keyToUse set to *primary*.

CellGroupId

The IE *CellGroupId* is used to identify a cell group. Value 0 identifies the master cell group. Other values identify secondary cell groups. In this version of the specification only values 0 and 1 are supported.

CellGroupId information element

```
-- ASN1START
-- TAG-CELLGROUPID-START

CellGroupId ::= INTEGER (0.. maxSecondaryCellGroups)

-- TAG-CELLGROUPID-STOP
-- ASN1STOP
```

CellIdentity

The IE CellIdentity is used to unambiguously identify a cell within a PLMN/SNPN.

CellIdentity information element

```
-- ASN1START
-- TAG-CELLIDENTITY-START

CellIdentity ::= BIT STRING (SIZE (36))

-- TAG-CELLIDENTITY-STOP
-- ASN1STOP
```

CellReselectionPriority

The IE *CellReselectionPriority* concerns the absolute priority of the concerned carrier frequency, as used by the cell reselection procedure. Corresponds to parameter "priority" in TS 38.304 [20]. Value 0 means lowest priority. The UE behaviour for the case the field is absent, if applicable, is specified in TS 38.304 [20].

CellReselectionPriority information element

-- ASN1START

```
-- TAG-CELLRESELECTIONPRIORITY-START

CellReselectionPriority ::= INTEGER (0..7)

-- TAG-CELLRESELECTIONPRIORITY-STOP

-- ASN1STOP
```

CellReselectionSubPriority

The IE *CellReselectionSubPriority* indicates a fractional value to be added to the value of *cellReselectionPriority* to obtain the absolute priority of the concerned carrier frequency for E-UTRA and NR. Value *oDot2* corresponds to 0.2, value *oDot4* corresponds to 0.4 and so on.

CellReselectionSubPriority information element

```
-- ASN1START
-- TAG-CELLRESELECTIONSUBPRIORITY-START

CellReselectionSubPriority ::= ENUMERATED {oDot2, oDot4, oDot6, oDot8}

-- TAG-CELLRESELECTIONSUBPRIORITY-STOP
-- ASN1STOP
```

CFR-ConfigMulticast

The IE CFR-ConfigMulticast indicates UE specific common frequency resource configuration for multicast for one dedicated BWP.

CFR-ConfigMulticast information element

```
-- ASN1START
-- TAG-CFR-CONFIGMULTICAST-START
CFR-ConfigMulticast-r17::= SEQUENCE {
    locationAndBandwidthMulticast-r17
                                                  INTEGER (0..37949)
                                                                                           OPTIONAL,
                                                                                                        -- Need S
    pdcch-ConfigMulticast-r17
                                                  PDCCH-Config
                                                                                           OPTIONAL,
                                                                                                        -- Need M
   pdsch-ConfigMulticast-r17
                                                  PDSCH-Config
                                                                                           OPTIONAL,
                                                                                                        -- Need M
                                                  SPS-ConfigMulticastToAddModList-r17
    sps-ConfigMulticastToAddModList-r17
                                                                                           OPTIONAL,
                                                                                                        -- Need N
    sps-ConfigMulticastToReleaseList-r17
                                                  SPS-ConfigMulticastToReleaseList-r17
                                                                                           OPTIONAL
                                                                                                        -- Need N
SPS-ConfigMulticastToAddModList-r17 ::= SEQUENCE (SIZE (1..8)) OF SPS-Config
SPS-ConfigMulticastToReleaseList-r17 ::= SEQUENCE (SIZE (1..8)) OF SPS-ConfigIndex-r16
-- TAG-CFR-CONFIGMULTICAST-STOP
-- ASN1STOP
```

CFR-ConfigMulticast field descriptions

locationAndBandwidthMulticast

Frequency domain location and bandwidth for MBS multicast. The value of the field shall be interpreted as resource indicator value (RIV) as defined TS 38.214 [19] with assumptions as described in TS 38.213 [13], clause 12, i.e. setting N^size_BWP=275. The first PRB is a PRB determined by subcarrierSpacing of the associated BWP and offsetToCarrier corresponding to this subcarrier spacing. If not configured, the UE applies the value of locationAndBandwidth of the DL BWP in which the cfr-ConfigMulticast is configured.

pdcch-ConfigMulticast

UE specific group-common PDCCH configuration for MBS multicast for one CFR.

pdsch-ConfigMulticast

UE specific group-common PDSCH configuration for MBS multicast for one CFR.

sps-ConfigMulticastToAddModList

Indicates a list of one or more DL SPS configurations for MBS multicast.

sps-ConfigMulticastToReleaseList

Indicates a list of one or more DL SPS configurations to be released. The NW may release a SPS configuration at any time.

CGI-InfoEUTRA

The IE CGI-InfoEUTRA indicates EUTRA cell access related information, which is reported by the UE as part of E-UTRA report CGI procedure.

CGI-InfoEUTRA information element

```
-- ASN1START
-- TAG-CGI-INFOEUTRA-START
CGI-InfoEUTRA ::=
                                         SEQUENCE {
    cgi-info-EPC
                                            SEOUENCE {
            cgi-info-EPC-legacy
                                                CellAccessRelatedInfo-EUTRA-EPC,
           cgi-info-EPC-list
                                                SEQUENCE (SIZE (1..maxPLMN)) OF CellAccessRelatedInfo-EUTRA-EPC
                                                                                                                              OPTIONAL
                                                                                                                              OPTIONAL,
    cgi-info-5GC
                                            SEOUENCE (SIZE (1..maxPLMN)) OF CellAccessRelatedInfo-EUTRA-5GC
                                                                                                                          OPTIONAL,
    fregBandIndicator
                                            FregBandIndicatorEUTRA,
   multiBandInfoList
                                            MultiBandInfoListEUTRA
                                                                                                                          OPTIONAL,
                                            ENUMERATED {true}
    fregBandIndicatorPriority
                                                                                                                          OPTIONAL
-- TAG-CGI-INFOEUTRA-STOP
-- ASN1STOP
```

CGI-InfoEUTRALogging

The IE CGI-InfoEUTRALogging indicates EUTRA cell related information, which is reported by the UE as part of RLF reporting procedure.

CGI-InfoEUTRALogging information element

```
-- TAG-CGI-INFOEUTRALOGGING-START
CGI-InfoEUTRALogging ::=
                                 SEOUENCE {
    plmn-Identity-eutra-5qc
                                     PLMN-Identity
                                                                                             OPTIONAL,
    trackingAreaCode-eutra-5gc
                                     TrackingAreaCode
                                                                                             OPTIONAL,
                               BIT STRING (SI
PLMN-Identity
    cellIdentity-eutra-5qc
                                     BIT STRING (SIZE (28))
                                                                                             OPTIONAL,
   plmn-Identity-eutra-epc
                                                                                             OPTIONAL,
                                BIT STRING (SIZE (16))
    trackingAreaCode-eutra-epc
                                                                                             OPTIONAL,
    cellIdentity-eutra-epc
                                     BIT STRING (SIZE (28))
                                                                                             OPTIONAL
-- TAG-CGI-INFOEUTRALOGGING-STOP
-- ASN1STOP
```

CGI-InfoEUTRALogging field descriptions

cellIdentity-eutra-epc, cellIdentity-eutra-5GC

Unambiguously identify a cell within the context of the PLMN. It belongs the first PLMN entry of *plmn-IdentityList* (when connected to EPC) or of *plmn-IdentityList-r15* (when connected to 5GC) in *SystemInformationBlockType1*.

plmn-Identity-eutra-epc, plmn-Identity-eutra-5GC

Identifies the PLMN of the cell for the reported *cellIdentity*: the first PLMN entry of *plmn-IdentityList* (when connected to EPC) or of *plmn-IdentityList-r15* (when connected to 5GC) in *SystemInformationBlockType1* that contained the reported *cellIdentity*.

trackingAreaCode-eutra-epc, trackingAreaCode-eutra-5gc

Indicates Tracking Area Code to which the cell indicated by cellIdentity-eutra-epc, cellIdentity-eutra-5GC belongs.

CGI-InfoNR

The IE CGI-InfoNR indicates cell access related information, which is reported by the UE as part of report CGI procedure.

CGI-InfoNR information element

```
-- ASN1START
-- TAG-CGI-INFO-NR-START
CGI-InfoNR ::=
                                   SEQUENCE {
    plmn-IdentityInfoList
                                         PLMN-IdentityInfoList
                                                                               OPTIONAL,
    frequencyBandList
                                         MultiFrequencyBandListNR
                                                                               OPTIONAL,
    noSIB1
                                         SEOUENCE {
        ssb-SubcarrierOffset
                                             INTEGER (0..15),
        pdcch-ConfigSIB1
                                             PDCCH-ConfigSIB1
                                                                               OPTIONAL,
    . . . ,
    [ [
                                         NPN-IdentityInfoList-r16
    npn-IdentityInfoList-r16
                                                                               OPTIONAL
    ]],
    [ [
    cellReservedForOtherUse-r16
                                         ENUMERATED {true}
                                                                               OPTIONAL
    ]]
```

```
-- TAG-CGI-INFO-NR-STOP
-- ASN1STOP
```

CGI-InfoNR field descriptions

noSIB1

Contains ssb-SubcarrierOffset and pdcch-ConfigSIB1 fields acquired by the UE from MIB of the cell for which report CGI procedure was requested by the network in case SIB1 was not broadcast by the cell.

cellReservedForOtherUse

Contains cellReservedForOtherUse field acquired by the UE that supports nr-CGI-Reporting-NPN from SIB1 of the cell for which report CGI procedure was requested by the network.

CGI-Info-Logging

The IE CGI-Info-Logging indicates the NR Cell Global Identifier (NCGI) for logging purposes (e.g. RLF report), the globally unique identity, and the TAC information of a cell in NR.

CGI-Info-Logging information element

```
-- ASN1START
-- TAG-CGI-INFO-LOGGING-START

CGI-Info-Logging-r16 ::= SEQUENCE {
    plmn-Identity-r16 PLMN-Identity,
    cellIdentity-r16 CellIdentity,
    trackingAreaCode-r16 TrackingAreaCode OPTIONAL
}

-- TAG-CGI-INFO-LOGGING-STOP
-- ASN1STOP
```

CGI-Info-Logging field descriptions

cellidentity

Unambiguously identify a cell within the context of the PLMN. It belongs the first PLMN-IdentityInfo IE of PLMN-IdentityInfo Iss in SIB1.

plmn-Identity

Identifies the PLMN of the cell for the reported *cellIdentity*: the first PLMN entry of *plmn-IdentityList* (in SIB1) in the instance of *PLMN-IdentityInfoList* that contained the reported *cellIdentity*.

trackingAreaCode

Indicates Tracking Area Code to which the cell indicated by cellIdentity field belongs.

CLI-RSSI-Range

The IE *CLI-RSSI-Range* specifies the value range used in CLI-RSSI measurements and thresholds. The integer value for CLI-RSSI measurements is according to Table 10.1.22.2.2-1 in TS 38.133 [14].

CLI-RSSI-Range information element

```
-- ASN1START
-- TAG-CLI-RSSI-RANGE-START

CLI-RSSI-Range-r16 ::= INTEGER(0..76)

-- TAG-CLI-RSSI-RANGE-STOP
-- ASN1STOP
```

CodebookConfig

The IE CodebookConfig is used to configure codebooks of Type-I and Type-II (see TS 38.214 [19], clause 5.2.2.2)

CodebookConfig information element

```
-- ASN1START
-- TAG-CODEBOOKCONFIG-START
CodebookConfig ::=
                                                          SEQUENCE {
    codebookType
                                                              CHOICE {
        type1
                                                                   SEQUENCE {
                                                                       CHOICE {
                 typeI-SinglePanel
                                                                            SEQUENCE {
                                                                                CHOICE .
                      nrOfAntennaPorts
                           two
                                                                                     SEOUENCE {
                               twoTX-CodebookSubsetRestriction
                                                                                         BIT STRING (SIZE (6))
                           moreThanTwo
                                                                                     SEOUENCE {
                               n1-n2
                                                                                         CHOICE {
                                   two-one-TypeI-SinglePanel-Restriction
                                                                                           BIT STRING (SIZE (8)),
                                   two-two-TypeI-SinglePanel-Restriction
                                                                                           BIT STRING (SIZE (64)),
                                   four-one-TypeI-SinglePanel-Restriction
                                                                                           BIT STRING (SIZE (16)),
                                                                                        BIT STRING (SIZE (96)),
BIT STRING (SIZE (24)),
BIT STRING (SIZE (24))
                                    three-two-TypeI-SinglePanel-Restriction
                                   six-one-TypeI-SinglePanel-Restriction
                                    four-two-TypeI-SinglePanel-Restriction
                                                                                             BIT STRING (SIZE (128)),
                                   eight-one-TypeI-SinglePanel-Restriction
                                                                                             BIT STRING (SIZE (32)),
                                    four-three-TypeI-SinglePanel-Restriction
                                                                                             BIT STRING (SIZE (192)),
                                   six-two-TypeI-SinglePanel-Restriction
                                                                                             BIT STRING (SIZE (192)),
                                                                                       BIT STRING (SIZE (1927),
BIT STRING (SIZE (48)),
BIT STRING (SIZE (256)),
BIT STRING (SIZE (256)),
BIT STRING (SIZE (64))
                                    twelve-one-TypeI-SinglePanel-Restriction
                                    four-four-TypeI-SinglePanel-Restriction
                                   eight-two-TypeI-SinglePanel-Restriction
                                   sixteen-one-TypeI-SinglePanel-Restriction
                                                                                             BIT STRING (SIZE (64))
                               },
```

```
typeI-SinglePanel-codebookSubsetRestriction-i2
                                                                         BIT STRING (SIZE (16))
                                                                                                        OPTIONAL
                                                                                                                    -- Need R
            typeI-SinglePanel-ri-Restriction
                                                                 BIT STRING (SIZE (8))
                                                             SEOUENCE {
        typeI-MultiPanel
            ng-n1-n2
                                                                     CHOICE {
                two-two-one-TypeI-MultiPanel-Restriction
                                                                         BIT STRING (SIZE (8)),
                two-four-one-TypeI-MultiPanel-Restriction
                                                                         BIT STRING (SIZE (16)),
                four-two-one-TypeI-MultiPanel-Restriction
                                                                         BIT STRING (SIZE (8)),
                two-two-two-TypeI-MultiPanel-Restriction
                                                                         BIT STRING (SIZE (64)),
                two-eight-one-TypeI-MultiPanel-Restriction
                                                                         BIT STRING (SIZE (32)),
                four-four-one-TypeI-MultiPanel-Restriction
                                                                         BIT STRING (SIZE (16)),
                two-four-two-TypeI-MultiPanel-Restriction
                                                                         BIT STRING (SIZE (128)),
                four-two-two-TypeI-MultiPanel-Restriction
                                                                         BIT STRING (SIZE (64))
            ri-Restriction
                                                     BIT STRING (SIZE (4))
    codebookMode
                                                         INTEGER (1..2)
},
                                        SEQUENCE {
type2
    subType
                                             CHOICE {
                                                 SEOUENCE
        typeII
            n1-n2-codebookSubsetRestriction
                                                     CHOICE {
                two-one
                                                         BIT STRING (SIZE (16)),
                t.wo-t.wo
                                                         BIT STRING (SIZE (43)),
                four-one
                                                         BIT STRING (SIZE (32)),
                three-two
                                                         BIT STRING (SIZE (59)),
                six-one
                                                         BIT STRING (SIZE (48)),
                four-two
                                                         BIT STRING (SIZE (75)),
                eight-one
                                                         BIT STRING (SIZE (64)),
                four-three
                                                         BIT STRING (SIZE (107)),
                six-two
                                                         BIT STRING (SIZE (107)),
                twelve-one
                                                         BIT STRING (SIZE (96)),
                four-four
                                                         BIT STRING (SIZE (139)),
                eight-two
                                                         BIT STRING (SIZE (139)),
                sixteen-one
                                                         BIT STRING (SIZE (128))
            typeII-RI-Restriction
                                                     BIT STRING (SIZE (2))
        typeII-PortSelection
                                                 SEOUENCE {
            portSelectionSamplingSize
                                                     ENUMERATED {n1, n2, n3, n4}
                                                                                                    OPTIONAL,
                                                                                                                     -- Need R
            typeII-PortSelectionRI-Restriction
                                                     BIT STRING (SIZE (2))
    phaseAlphabetSize
                                             ENUMERATED {n4, n8},
    subbandAmplitude
                                             BOOLEAN,
    numberOfBeams
                                             ENUMERATED {two, three, four}
```

```
CodebookConfig-r16 ::=
                                       SEOUENCE {
    codebookType
                                           CHOICE {
        type2
                                               SEQUENCE
            subType
                                                    CHOICE
                typeII-r16
                                                        SEOUENCE
                    n1-n2-codebookSubsetRestriction-r16
                                                            CHOICE {
                        t.wo-one
                                                                BIT STRING (SIZE (16)),
                        two-two
                                                                BIT STRING (SIZE (43)).
                        four-one
                                                                BIT STRING (SIZE (32)),
                        three-two
                                                                BIT STRING (SIZE (59)),
                        six-one
                                                                BIT STRING (SIZE (48)),
                        four-two
                                                                BIT STRING (SIZE (75)),
                        eight-one
                                                                BIT STRING (SIZE (64)),
                        four-three
                                                                BIT STRING (SIZE (107)),
                        six-two
                                                                BIT STRING (SIZE (107)),
                        twelve-one
                                                                BIT STRING (SIZE (96)),
                        four-four
                                                                BIT STRING (SIZE (139)),
                        eight-two
                                                                BIT STRING (SIZE (139)),
                        sixteen-one
                                                                BIT STRING (SIZE (128))
                    typeII-RI-Restriction-r16
                                                            BIT STRING (SIZE(4))
                typeII-PortSelection-r16 SEQUENCE {
                    portSelectionSamplingSize-r16
                                                            ENUMERATED {n1, n2, n3, n4},
                    typeII-PortSelectionRI-Restriction-r16 BIT STRING (SIZE (4))
        numberOfPMI-SubbandsPerCOI-Subband-r16 INTEGER (1..2),
        paramCombination-r16
                                               INTEGER (1..8)
CodebookConfig-r17 ::=
                                      SEQUENCE
    codebookType
                                          CHOICE
        type1
                                               SEQUENCE {
            typeI-SinglePanel-Group1-r17
                                                   SEQUENCE -
                nrOfAntennaPorts
                                                       CHOICE
                    t.wo
                                                           SEOUENCE ·
                        twoTX-CodebookSubsetRestriction1-r17 BIT STRING (SIZE (6))
                    moreThanTwo
                                                            SEOUENCE {
                        n1-n2
                                                                      CHOICE {
                            two-one-TypeI-SinglePanel-Restriction1-r17
                                                                              BIT STRING (SIZE (8)),
                            two-two-TypeI-SinglePanel-Restriction1-r17
                                                                              BIT STRING (SIZE (64)).
                            four-one-TypeI-SinglePanel-Restriction1-r17
                                                                              BIT STRING (SIZE (16)),
                            three-two-TypeI-SinglePanel-Restriction1-r17
                                                                              BIT STRING (SIZE (96)),
                            six-one-TypeI-SinglePanel-Restriction1-r17
                                                                              BIT STRING (SIZE (24)),
                            four-two-TypeI-SinglePanel-Restriction1-r17
                                                                              BIT STRING (SIZE (128)),
                            eight-one-TypeI-SinglePanel-Restriction1-r17
                                                                              BIT STRING (SIZE (32)),
                            four-three-TypeI-SinglePanel-Restriction1-r17
                                                                              BIT STRING (SIZE (192)),
                            six-two-TypeI-SinglePanel-Restriction1-r17
                                                                              BIT STRING (SIZE (192)),
                            twelve-one-TypeI-SinglePanel-Restriction1-r17
                                                                              BIT STRING (SIZE (48)),
                            four-four-TypeI-SinglePanel-Restriction1-r17
                                                                              BIT STRING (SIZE (256)),
```

```
eight-two-TypeI-SinglePanel-Restriction1-r17
                                                                             BIT STRING (SIZE (256)),
                            sixteen-one-TypeI-SinglePanel-Restriction1-r17 BIT STRING (SIZE (64))
                                                                                                    OPTIONAL, -- Need R
            typeI-SinglePanel-Group2-r17
                                                   SEOUENCE {
               nrOfAntennaPorts
                                                       CHOICE {
                    two.
                                                           SEQUENCE {
                        twoTX-CodebookSubsetRestriction2-r17 BIT STRING (SIZE (6))
                    moreThanTwo
                                                           SEOUENCE {
                       n1-n2
                                                                     CHOICE {
                            two-one-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (8)),
                            two-two-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (64)),
                            four-one-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (16)),
                            three-two-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (96)),
                            six-one-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (24)),
                            four-two-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (128)),
                            eight-one-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (32)),
                            four-three-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (192)),
                            six-two-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (192)),
                            twelve-one-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (48)),
                            four-four-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (256)),
                            eight-two-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (256)),
                            sixteen-one-TypeI-SinglePanel-Restriction2-r17
                                                                             BIT STRING (SIZE (64))
                                                                                                    OPTIONAL, -- Need R
            typeI-SinglePanel-ri-RestrictionSTRP-r17
                                                                        BIT STRING (SIZE (8))
                                                                                                    OPTIONAL, -- Need R
            typeI-SinglePanel-ri-RestrictionSDM-r17
                                                                                                    OPTIONAL -- Need R
                                                                        BIT STRING (SIZE (4))
        },
                                              SEQUENCE {
        type2
            typeII-PortSelection-r17
                                                  SEOUENCE {
               paramCombination-r17
                                                       INTEGER (1..8),
               valueOfN-r17
                                                       ENUMERATED {n2, n4}
                                                                                                    OPTIONAL, -- Need R
               numberOfPMI-SubbandsPerCOI-Subband-r17 INTEGER(1..2)
                                                                                                    OPTIONAL, -- Need R
                typeII-PortSelectionRI-Restriction-r17 BIT STRING (SIZE (4))
CodebookConfig-v1730 ::=
                                      SEOUENCE {
    codebookType
                                          CHOICE
        type1
                                              SEOUENCE
           codebookMode
                                                  INTEGER (1..2)
                                                                                                    OPTIONAL -- Need R
-- TAG-CODEBOOKCONFIG-STOP
-- ASN1STOP
```

CodebookConfig field descriptions

codebookMode

CodebookMode as specified in TS 38.214 [19], clause 5.2.2.2.2.

codebookType

CodebookType including possibly sub-types and the corresponding parameters for each (see TS 38.214 [19], clause 5.2.2.2).

n1-n2-codebookSubsetRestriction

Number of antenna ports in first (n1) and second (n2) dimension and codebook subset restriction (see TS 38.214 [19] clause 5.2.2.2.3).

Number of bits for codebook subset restriction is CEIL(log2(nchoosek(O1*O2,4)))+8*n1*n2 where nchoosek(a,b) = a!/(b!(a-b)!).

n1-n2

Number of antenna ports in first (n1) and second (n2) dimension and codebook subset restriction (see TS 38.214 [19] clause 5.2.2.2.1).

ng-n1-n2

Codebook subset restriction for Type I Multi-panel codebook (see TS 38.214 [19], clause 5.2.2.2.2).

numberOfBeams

Number of beams, L, used for linear combination.

numberOfPMI-SubbandsPerCQI-Subband

Field indicates how PMI subbands are defined per CQI subband according to TS 38.214 [19], clause 5.2.2.2.5, and 5.2.2.2.7.

paramCombination

Field describes supported parameter combination (M, α , β) as specified in TS 38.214 [19].

phaseAlphabetSize

The size of the PSK alphabet, QPSK or 8-PSK.

portSelectionSamplingSize

The size of the port selection codebook (parameter d), see TS 38.214 [19] clause 5.2.2.2.6.

ri-Restriction

Restriction for RI for TypeI-MultiPanel-RI-Restriction (see TS 38.214 [19], clause 5.2.2.2.2).

subbandAmplitude

If subband amplitude reporting is activated (true).

twoTX-CodebookSubsetRestriction

Codebook subset restriction for 2TX codebook (see TS 38.214 [19] clause 5.2.2.2.1).

typel-SinglePanel-codebookSubsetRestriction-i2

i2 codebook subset restriction for Type I Single-panel codebook used when reportQuantity is CRI/Ri/i1/CQI (see TS 38.214 [19] clause 5.2.2.2.1).

typel-SinglePanel-ri-Restriction

Restriction for RI for TypeI-SinglePanel-RI-Restriction (see TS 38.214 [19], clause 5.2.2.2.1).

typel-SinglePanel-Group1, typel-SinglePanel-Group2

Configures codebooks for CSI calculation when UE is configured with two CMR Groups with CMRGroupingAndPairing in the NZP-CSI-RS-ResourceSet associated with the CSI-ReportConfig. Network configures the same number of ports for both codebooks.

typel-SinglePanel-ri-RestrictionSDM, typel-SinglePanel-ri-RestrictionSTRP

Restriction for RI for N Resource Pairs when two CMR Groups are configured with CMRGroupingAndPairing in the NZP-CSI-RS-ResourceSet associated with the CSI-ReportConfig (see TS 38.214 [19], clause 5.2.1.4.2).

typeII-PortSelectionRI-Restriction

Restriction for RI for TypeII-PortSelection-RI-Restriction (see TS 38.214 [19], clauses 5.2.2.2.4 and 5.2.2.2.6).

typeII-RI-Restriction

Restriction for RI for TypeII-RI-Restriction (see TS 38.214 [19], clauses 5.2.2.2.3 and 5.2.2.2.5).

valueOfN

Field provides the value of parameter N as specified in TS 38.214 [19], clause 5.2.2.2.7. The field is present only when M=2 set by paramCombination, see TS 38.214 [19].

CommonLocationInfo

The IE CommonLocationInfo is used to transfer detailed location information available at the UE to correlate measurements and UE position information.

CommonLocationInfo information element

```
-- ASN1START
-- TAG-COMMONLOCATIONINFO-START
CommonLocationInfo-r16 ::= SEQUENCE {
   gnss-TOD-msec-r16
                            OCTET STRING
                                             OPTIONAL,
   locationTimestamp-r16
                            OCTET STRING
                                             OPTIONAL,
   locationCoordinate-r16 OCTET STRING
                                             OPTIONAL,
   locationError-r16
                            OCTET STRING
                                             OPTIONAL,
   locationSource-r16
                             OCTET STRING
                                             OPTIONAL,
   velocityEstimate-r16
                            OCTET STRING
                                             OPTIONAL
-- TAG-COMMONLOCATIONINFO-STOP
-- ASN1STOP
```

CommonLocationInfo field descriptions

gnss-TOD-msec

Parameter type gnss-TOD-msec defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

locationTimeStamp

Parameter type DisplacementTimeStamp defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

locationCoordinate

Parameter type LocationCoordinates defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

IocationError

Parameter LocationError defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

locationSource

Parameter LocationSource defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

velocitvEstimate

Parameter type Velocity defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

CondReconfigld

The IE CondReconfigId is used to identify a CHO, CPA or CPC configuration.

CondReconfigId information element

```
-- ASN1START
-- TAG-CONDRECONFIGID-START

CondReconfiqId-r16 ::= INTEGER (1.. maxNrofCondCells-r16)
```

```
-- TAG-CONDRECONFIGID-STOP
-- ASN1STOP
```

CondReconfigToAddModList

The IE *CondReconfigToAddModList* concerns a list of conditional reconfigurations to add or modify, with for each entry the *condReconfigId* and the associated *condExecutionCond/condExecutionCondSCG* and *condRRCReconfig*.

CondReconfigToAddModList information element

```
-- ASN1START
-- TAG-CONDRECONFIGTOADDMODLIST-START
CondReconfigToAddModList-r16 ::= SEOUENCE (SIZE (1.. maxNrofCondCells-r16)) OF CondReconfigToAddMod-r16
CondReconfigToAddMod-r16 ::=
                                  SEOUENCE {
    condReconfigId-r16 CondReconfigId-r16,
    condExecutionCond-r16 SEQUENCE (SIZE (1..2)) OF MeasId condRRCReconfig-r16 OCTET STRING (CONTAINING RRCReconfiguration)
                                                                                               OPTIONAL,
                                                                                                             -- Need M
                                                                                               OPTIONAL,
                                                                                                             -- Cond condReconfigAdd
    . . . ,
    ] ]
    condExecutionCondSCG-r17
                                      OCTET STRING (CONTAINING CondReconfigExecCondSCG-r17) OPTIONAL
CondReconfigExecCondSCG-r17 ::= SEQUENCE (SIZE (1..2)) OF MeasId
-- TAG-CONDRECONFIGTOADDMODLIST-STOP
-- ASN1STOP
```

CondReconfigToAddMod field descriptions

condExecutionCond

The execution condition that needs to be fulfilled in order to trigger the execution of a conditional reconfiguration for CHO, CPA, intra-SN CPC without MN involvement or MN initiated inter-SN CPC. When configuring 2 triggering events (Meas Ids) for a candidate cell, the network ensures that both refer to the same *measObject*. For CHO, if the network configures *condEventD1* or *condEventA4* or *condEventA5* for the same candidate cell. The network does not configure both *condEventD1* and *condEventT1* for the same candidate cell. For CHO in terrestrial networks, the network does not indicate a *MeasId* associated with *condEventA4*. For CPA and for MN-initiated inter-SN CPC, the network only indicates *MeasId*(s) associated with *condEventA3* or *condEventA5*.

condExecutionCondSCG

Contains execution condition that needs to be fulfilled in order to trigger the execution of a conditional reconfiguration for SN initiated inter-SN CPC. The Meas Ids refer to the measConfig associated with the SCG. When configuring 2 triggering events (Meas Ids) for a candidate cell, network ensures that both refer to the same measObject. For each condReconfigId, the network always configures either condExecutionCond or condExecutionCondSCG (not both). The network only indicates MeasId(s) associated with condEventA3 or condEventA5.

condRRCReconfig

The RRCReconfiguration message to be applied when the condition(s) are fulfilled. The RRCReconfiguration message contained in condRRCReconfig cannot contain the field conditionalReconfiguration or the field daps-Config.

Conditional Presence	Explanation
condReconfigAdd	The field is mandatory present when a <i>condReconfigId</i> is being added. Otherwise the field is optional, need M.

ConditionalReconfiguration

The IE Conditional Reconfiguration is used to add, modify and release the configuration of conditional reconfiguration.

ConditionalReconfiguration information element

ConditionalReconfiguration field descriptions

attemptCondReconfig

If present, the UE shall perform conditional reconfiguration if selected cell is a target candidate cell and it is the first cell selection after failure as described in clause 5.3.7.3.

condReconfigToAddModList

List of the configuration of candidate SpCells to be added or modified for CHO, CPA or CPC.

condReconfigToRemoveList

List of the configuration of candidate SpCells to be removed.

Conditional Presence	Explanation
CHO CHO	The field is optional present, Need R, if the UE is configured with at least a candidate SpCell for CHO. Otherwise the field is
	not present.

ConfiguredGrantConfig

The IE *ConfiguredGrantConfig* is used to configure uplink transmission without dynamic grant according to two possible schemes. The actual uplink grant may either be configured via RRC (*type1*) or provided via the PDCCH (addressed to CS-RNTI) (*type2*). Multiple Configured Grant configurations may be configured in one BWP of a serving cell.

ConfiguredGrantConfig information element

```
-- ASN1START
-- TAG-CONFIGUREDGRANTCONFIG-START
ConfiguredGrantConfig ::=
                                    SEOUENCE {
                                        ENUMERATED {intraSlot, interSlot}
    frequencyHopping
                                                                                                                            -- Need S
                                                                                                                OPTIONAL,
    cg-DMRS-Configuration
                                        DMRS-UplinkConfig,
    mcs-Table
                                        ENUMERATED { gam256, gam64LowSE}
                                                                                                                OPTIONAL,
                                                                                                                            -- Need S
    mcs-TableTransformPrecoder
                                        ENUMERATED { gam256, gam64LowSE }
                                                                                                                OPTIONAL,
                                                                                                                            -- Need S
                                        SetupRelease { CG-UCI-OnPUSCH }
    uci-OnPUSCH
                                                                                                                OPTIONAL,
                                                                                                                            -- Need M
    resourceAllocation
                                        ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch },
    rbq-Size
                                        ENUMERATED {config2}
                                                                                                                OPTIONAL.
                                                                                                                            -- Need S
                                        ENUMERATED {n0, n1},
    powerControlLoopToUse
    p0-PUSCH-Alpha
                                        PO-PUSCH-AlphaSetId,
                                        ENUMERATED {enabled, disabled}
    transformPrecoder
                                                                                                                OPTIONAL.
                                                                                                                            -- Need S
    nrofHARO-Processes
                                        INTEGER(1..16),
                                        ENUMERATED {n1, n2, n4, n8},
    repK
                                        ENUMERATED {s1-0231, s2-0303, s3-0000}
    repK-RV
                                                                                                                OPTIONAL,
                                                                                                                           -- Need R
    periodicity
                                        ENUMERATED
                                                sym2, sym7, sym1x14, sym2x14, sym4x14, sym5x14, sym8x14, sym10x14, sym16x14, sym20x14,
                                                svm32x14, sym40x14, sym64x14, sym80x14, sym128x14, sym160x14, sym256x14, sym320x14, sym512x14,
                                                sym640x14, sym1024x14, sym1280x14, sym2560x14, sym5120x14,
                                                sym6, sym1x12, sym2x12, sym4x12, sym5x12, sym8x12, sym10x12, sym16x12, sym20x12, sym32x12,
                                                sym40x12, sym64x12, sym80x12, sym128x12, sym160x12, sym256x12, sym320x12, sym512x12, sym640x12,
                                                sym1280x12, sym2560x12
    configuredGrantTimer
                                        INTEGER (1..64)
                                                                                                                OPTIONAL, -- Need R
    rrc-ConfiguredUplinkGrant
                                        SEOUENCE {
        timeDomainOffset
                                            INTEGER (0..5119),
        timeDomainAllocation
                                            INTEGER (0..15),
                                            BIT STRING (SIZE(18)),
        frequencyDomainAllocation
        antennaPort
                                            INTEGER (0..31),
        dmrs-SeqInitialization
                                            INTEGER (0..1)
                                                                                                                   OPTIONAL,
                                                                                                                              -- Need R
        precodingAndNumberOfLayers
                                            INTEGER (0..63),
        srs-ResourceIndicator
                                            INTEGER (0..15)
                                                                                                                   OPTIONAL,
                                                                                                                               -- Need R
        mcsAndTBS
                                            INTEGER (0..31),
                                            INTEGER (1.. maxNrofPhysicalResourceBlocks-1)
        frequencyHoppingOffset
                                                                                                                   OPTIONAL.
                                                                                                                               -- Need R
        pathlossReferenceIndex
                                            INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1),
        . . . ,
                                            ENUMERATED {pusch-RepTypeA, pusch-RepTypeB}
        pusch-RepTypeIndicator-r16
                                                                                                                   OPTIONAL,
                                                                                                                              -- Need M
        frequencyHoppingPUSCH-RepTypeB-r16
                                            ENUMERATED {interRepetition, interSlot}
                                                                                                                   OPTIONAL,
                                                                                                                               -- Cond RepTypeB
        timeReferenceSFN-r16
                                            ENUMERATED {sfn512}
                                                                                                                   OPTIONAL
                                                                                                                               -- Need S
       11,
       11
        pathlossReferenceIndex2-r17
                                           INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1)
                                                                                                                   OPTIONAL,
                                                                                                                               -- Need R
        srs-ResourceIndicator2-r17
                                           INTEGER (0..15)
                                                                                                                   OPTIONAL, -- Need R
        precodingAndNumberOfLayers2-r17
                                           INTEGER (0..63)
                                                                                                                   OPTIONAL, -- Need R
        timeDomainAllocation-v1710
                                           INTEGER (16..63)
                                                                                                                   OPTIONAL,
                                                                                                                                -- Need M
        timeDomainOffset-r17
                                           INTEGER (0..40959)
                                                                                                                   OPTIONAL,
                                                                                                                              -- Need R
        cg-SDT-Configuration-r17
                                           CG-SDT-Configuration-r17
                                                                                                                               -- Need M
                                                                                                                   OPTIONAL
        ]]
                                                                                                                OPTIONAL, -- Need R
```

```
П
    cg-RetransmissionTimer-r16
                                            INTEGER (1..64)
                                                                                                                OPTIONAL.
    cq-minDFI-Delay-r16
                                            ENUMERATED
                                                    {sym7, sym1x14, sym2x14, sym3x14, sym4x14, sym5x14, sym6x14, sym7x14, sym8x14,
                                                    sym9x14, sym10x14, sym11x14, sym12x14, sym13x14, sym14x14,sym15x14, sym16x14
                                                                                                        OPTIONAL, -- Need R
                                                                                                                  -- Need R
    cg-nrofPUSCH-InSlot-r16
                                            INTEGER (1..7)
                                                                                                        OPTIONAL,
    cg-nrofSlots-r16
                                           INTEGER (1..40)
                                                                                                        OPTIONAL, -- Need R
                                                                                                                  -- Need R
    cg-StartingOffsets-r16
                                           CG-StartingOffsets-r16
                                                                                                        OPTIONAL,
    cg-UCI-Multiplexing-r16
                                           ENUMERATED {enabled}
                                                                                                        OPTIONAL,
                                                                                                                 -- Need R
                                           INTEGER (1..39)
                                                                                                       OPTIONAL, -- Need R
    cg-COT-SharingOffset-r16
                                                                                                       OPTIONAL, -- Need R
    betaOffsetCG-UCI-r16
                                           INTEGER (0..31)
    cg-COT-SharingList-r16
                                           SEQUENCE (SIZE (1..1709)) OF CG-COT-Sharing-r16
                                                                                                        OPTIONAL.
                                                                                                                  -- Need R
                                                                                                        OPTIONAL, -- Need M
    harg-ProcID-Offset-r16
                                           INTEGER (0..15)
    harg-ProcID-Offset2-r16
                                           INTEGER (0..15)
                                                                                                        OPTIONAL, -- Need M
                                           ConfiguredGrantConfigIndex-r16
                                                                                                        OPTIONAL, -- Cond CG-List
    configuredGrantConfigIndex-r16
                                           ConfiguredGrantConfigIndexMAC-r16
    configuredGrantConfigIndexMAC-r16
                                                                                                        OPTIONAL, -- Cond CG-IndexMAC
    periodicityExt-r16
                                           INTEGER (1..5120)
                                                                                                        OPTIONAL, -- Need R
    startingFromRV0-r16
                                           ENUMERATED {on, off}
                                                                                                        OPTIONAL, -- Need R
    phy-PriorityIndex-r16
                                            ENUMERATED {p0, p1}
                                                                                                        OPTIONAL,
                                                                                                                   -- Need R
    autonomousTx-r16
                                            ENUMERATED {enabled}
                                                                                                                  -- Cond LCH-BasedPrioritization
                                                                                                        OPTIONAL
    11.
    cq-betaOffsetsCrossPri0-r17
                                           SetupRelease { BetaOffsetsCrossPriSelCG-r17
                                                                                                        OPTIONAL,
                                                                                                                  -- Need M
    cq-betaOffsetsCrossPri1-r17
                                           SetupRelease { BetaOffsetsCrossPriSelCG-r17
                                                                                                        OPTIONAL,
                                                                                                                   -- Need M
    mappingPattern-r17
                                           ENUMERATED {cyclicMapping, sequentialMapping}
                                                                                                        OPTIONAL,
                                                                                                                   -- Cond SRSsets
    sequenceOffsetForRV-r17
                                            INTEGER (0..3)
                                                                                                        OPTIONAL,
                                                                                                                   -- Need R
    p0-PUSCH-Alpha2-r17
                                           P0-PUSCH-AlphaSetId
                                                                                                                  -- Need R
                                                                                                        OPTIONAL,
                                                                                                        OPTIONAL, -- Need R
    powerControlLoopToUse2-r17
                                            ENUMERATED {n0, n1}
                                           SEQUENCE (SIZE (1..50722)) OF CG-COT-Sharing-r17
                                                                                                        OPTIONAL, -- Need R
    cg-COT-SharingList-r17
    periodicityExt-r17
                                           INTEGER (1..40960)
                                                                                                        OPTIONAL, -- Need R
    repK-v1710
                                           ENUMERATED {n12, n16, n24, n32}
                                                                                                        OPTIONAL, -- Need R
    nrofHARQ-Processes-v1700
                                           INTEGER(17..32)
                                                                                                        OPTIONAL, -- Need M
    harg-ProcID-Offset2-v1700
                                           INTEGER (16..31)
                                                                                                        OPTIONAL,
                                                                                                                  -- Need R
    configuredGrantTimer-v1700
                                           INTEGER(33..288)
                                                                                                        OPTIONAL,
                                                                                                                  -- Need R
    cq-minDFI-Delay-v1710
                                            INTEGER (238..3584)
                                                                                                        OPTIONAL
                                                                                                                   -- Need R
    ]],
    ] ]
    harg-ProcID-Offset-v1730
                                            INTEGER (16..31)
                                                                                                        OPTIONAL,
                                                                                                                    -- Need R
    cq-nrofSlots-r17
                                           INTEGER (1..320)
                                                                                                                    -- Need R
                                                                                                        OPTIONAL
    11
CG-UCI-OnPUSCH ::= CHOICE {
    dynamic
                                           SEOUENCE (SIZE (1..4)) OF BetaOffsets,
    semiStatic
                                           BetaOffsets
CG-COT-Sharing-r16 ::= CHOICE {
    noCOT-Sharing-r16
                                        NULL,
    cot-Sharing-r16
                                        SEOUENCE {
         duration-r16
                                           INTEGER (1..39),
         offset-r16
                                           INTEGER (1..39),
```

```
channelAccessPriority-r16
                                           INTEGER (1..4)
CG-COT-Sharing-r17 ::= CHOICE {
    noCOT-Sharing-r17
                                       NULL,
    cot-Sharing-r17
                                       SEOUENCE {
        duration-r17
                                           INTEGER (1..319),
        offset-r17
                                           INTEGER (1..319)
CG-StartingOffsets-r16 ::= SEQUENCE {
    cg-StartingFullBW-InsideCOT-r16
                                           SEQUENCE (SIZE (1..7)) OF INTEGER (0..6)
                                                                                                OPTIONAL.
                                                                                                           -- Need R
    cq-StartingFullBW-OutsideCOT-r16
                                           SEQUENCE (SIZE (1..7)) OF INTEGER (0..6)
                                                                                                OPTIONAL, -- Need R
    cq-StartingPartialBW-InsideCOT-r16
                                           INTEGER (0..6)
                                                                                                OPTIONAL, -- Need R
                                                                                                            -- Need R
    cq-StartingPartialBW-OutsideCOT-r16
                                           INTEGER (0..6)
                                                                                                OPTIONAL
BetaOffsetsCrossPriSelCG-r17 ::= CHOICE {
    dvnamic-r17
                       SEQUENCE (SIZE (1..4)) OF BetaOffsetsCrossPri-r17,
    semiStatic-r17
                       BetaOffsetsCrossPri-r17
CG-SDT-Configuration-r17 ::= SEQUENCE {
    cg-SDT-RetransmissionTimer INTEGER (1..64)
                                                                                                OPTIONAL, -- Need R
                            CHOICE {
    sdt-SSB-Subset-r17
       shortBitmap-r17
                                BIT STRING (SIZE (4)),
       mediumBitmap-r17
                                BIT STRING (SIZE (8)),
       longBitmap-r17
                                BIT STRING (SIZE (64))
                                                                                                OPTIONAL, -- Need S
    sdt-SSB-PerCG-PUSCH-r17 ENUMERATED {oneEighth, oneFourth, half, one, two, four, eight, sixteen} OPTIONAL, -- Need M
    sdt-P0-PUSCH-r17
                            INTEGER (-16..15)
                                                                                                OPTIONAL, -- Need M
                            ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1} OPTIONAL, -- Need M
    sdt-Alpha-r17
    sdt-DMRS-Ports-r17
                            CHOICE {
       dmrsType1-r17
                                BIT STRING (SIZE (8)),
       dmrsType2-r17
                                BIT STRING (SIZE (12))
                                                                                                OPTIONAL, -- Need M
    sdt-NrofDMRS-Sequences-r17 INTEGER (1..2)
                                                                                                OPTIONAL -- Need M
-- TAG-CONFIGUREDGRANTCONFIG-STOP
-- ASN1STOP
```

ConfiguredGrantConfig field descriptions

antennaPort

Indicates the antenna port(s) to be used for this configuration, and the maximum bitwidth is 5. See TS 38.214 [19], clause 6.1.2, and TS 38.212 [17], clause 7.3.1. The UE ignores this field in case of CG-SDT.

autonomousTx

If this field is present, the Configured Grant configuration is configured with autonomous transmission, see TS 38.321 [3].

betaOffsetCG-UCI

Beta offset for CG-UCI in CG-PUSCH, see TS 38.213 [13], clause 9.3

cg-betaOffsetsCrossPri0, cg-betaOffsetsCrossPri1

Selection between and configuration of dynamic and semi-static beta-offset for multiplexing HARQ-ACK in CG-PUSCH with different priorities.

The field *cg-betaOffsetsCrossPri0* indicates multiplexing LP HARQ-ACK in HP CG-PUSCH. This field is configured only if *phy-PriorityIndex-r16* is configured with value *p1*. The field *cg-betaOffsetsCrossPri1* indicates multiplexing HP HARQ-ACK in LP CG-PUSCH. This field is configured only if *phy-PriorityIndex-r16* is configured with value *p0*.

cg-COT-SharingList

Indicates a table for COT sharing combinations (see 37.213 [48], clause 4.1.3). One row of the table can be set to noCOT-Sharing to indicate that there is no channel occupancy sharing. If the *cg-RetransmissionTimer-r16* is configured and the UE operates as an initiating device in semi-static channel access mode (see TS 37.213 [48], clause 4.3), then *cg-COT-SharingList-r16* is configured.

cg-COT-SharingOffset

Indicates the offset from the end of the slot where the COT sharing indication in UCI is enabled where the offset in symbols is equal to 14*n, where n is the signaled value for *cq-COT-SharingOffset*. Applicable when *ul-toDL-COT-SharingED-Threshold-r16* is not configured (see 37.213 [48], clause 4.1.3).

cg-DMRS-Configuration

DMRS configuration (see TS 38.214 [19], clause 6.1.2.3).

cg-minDFI-Delay

Indicates the minimum duration (in unit of symbols) from the ending symbol of the PUSCH to the starting symbol of the PDCCH containing the downlink feedback indication (DFI) carrying HARQ-ACK for this PUSCH. The HARQ-ACK received before this minimum duration is not considered as valid for this PUSCH (see TS 38.213 [13], clause 10.5). The following minimum duration values are supported, depending on the configured subcarrier spacing [symbols]:

```
15 kHz: 7, m^*14, where m = \{1, 2, 3, 4\}
```

30 kHz: 7, m*14, where m = $\{1, 2, 3, 4, 5, 6, 7, 8\}$

60 kHz: 7, m*14, where m = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16}

120 kHz: 7, m*14, where m = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32}

480 kHz: m*14, where m = {2, 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96, 100, 104, 108, 112, 116, 120, 124, 128}

960 kHz: m*14, where $m = \{4, 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 160, 168, 176, 184, 192, 200, 208, 216, 224, 232, 240, 248, 256}$

ca-nrofPUSCH-InSlot

Indicates the number of consecutive PUSCH configured to CG within a slot where the SLIV indicating the first PUSCH and additional PUSCH appended with the same length (see TS 38.214 [19], clause 6.1.2.3). The network can only configure this field if *cg-RetransmissionTimer* is configured.

cq-nrofSlots

Indicates the number of allocated slots in a configured grant periodicity following the time instance of configured grant offset (see TS 38.214 [19], clause 6.1.2.3). *cg-nrofSlots-r17* is only applicable for operation with shared spectrum channel access in FR2-2. When *cg-nrofSlots-r17* is configured, the UE shall ignore *cg-nrofSlots-r16*. The network can only configure this field if *cg-RetransmissionTimer* is configured.

ca-RetransmissionTimer

Indicates the initial value of the configured retransmission timer (see TS 38.321 [3]) in multiples of *periodicity*. The value of *cg-RetransmissionTimer* is always less than or equal to the value of *configuredGrantTimer*. This field is always configured together with *harq-ProcID-Offset*. This field is not configured for operation in licensed spectrum or simultaneously with *harq-ProcID-Offset2*. The network does not configure this field for CG-SDT.

cg-StartingOffsets

This field is not applicable for a UE which is allowed to operate as an initiating device in semi-static channel access mode, i.e., not applicable for a UE configured with UE FFP parameters (e.g. period, offset) regardless whether the UE would initiate its own COT or would share gNB's COT.

cq-UCI-Multiplexing

If present, this field indicates that in the case of PUCCH overlapping with CG-PUSCH(s) within a PUCCH group, the CG-UCI and HARQ-ACK are jointly encoded (see TS 38.213 [13], clause 9).

configuredGrantConfigIndex

Indicates the index of the Configured Grant configurations within the BWP.

configuredGrantConfigIndexMAC

Indicates the index of the Configured Grant configurations within the MAC entity.

configuredGrantTimer

Indicates the initial value of the configured grant timer (see TS 38.321 [3]) in multiples of periodicity. When *cg-RetransmissonTimer* is configured, if HARQ processes are shared among different configured grants on the same BWP, *configuredGrantTimer* * *periodicity* is set to the same value for the configurations that share HARQ processes on this BWP. The value of the extension *configuredGrantTimer* is 2 times the configured value.

dmrs-SegInitialization

The network configures this field if transformPrecoder is disabled or when the value of sdt-NrofDMRS-Sequences is set to 1. Otherwise, the field is absent.

frequencyDomainAllocation

Indicates the frequency domain resource allocation, see TS 38.214 [19], clause 6.1.2, and TS 38.212 [17], clause 7.3.1).

frequencyHopping

The value *intraSlot* enables 'Intra-slot frequency hopping' and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured. The field *frequencyHopping* applies to configured grant for 'pusch-RepTypeA' (see TS 38.214 [19], clause 6.3.1).

frequencyHoppingOffset

Frequency hopping offset used when frequency hopping is enabled (see TS 38.214 [19], clause 6.1.2 and clause 6.3).

frequencyHoppingPUSCH-RepTypeB

Indicates the frequency hopping scheme for Type 1 CG when *pusch-RepTypeIndicator* is set to 'pusch-RepTypeB' (see TS 38.214 [19], clause 6.1). The value *interRepetition* enables 'Inter-repetition frequency hopping', and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, the frequency hopping is not enabled for Type 1 CG.

harg-ProcID-Offset

For operation with shared spectrum channel access configured with *cg-RetransmissionTimer-r16*, this configures the range of HARQ process IDs which can be used for this configured grant where the UE can select a HARQ process ID within [harq-procID-offset, ..., (harq-procID-offset + nrofHARQ-Processes – 1)]. harq-ProcID-Offset-v1730 is only applicable for operation with shared spectrum channel access in FR2-2. If the field harq-ProcID-Offset-v1730 is present, the UE shall ignore the harq-ProcID-Offset-r16. The network does not configure this field for CG-SDT.

harg-ProcID-Offset2

Indicates the offset used in deriving the HARQ process IDs, see TS 38.321 [3], clause 5.4.1. This field is not configured together with *cg-RetransmissionTimer-r16*. If the field *harq-ProcID-Offset2-v1700* is present, the UE shall ignore the *harq-ProcID-Offset2-r16*.

mappingPattern

Indicates whether the UE should follow Cyclical mapping pattern or Sequential mapping pattern when two SRS resource sets are configured in srs-ResourceSetToAddModList or srs-ResourceSetToAddModListDCI-0-2 with usage 'codebook' or 'noncodebook' for PUSCH transmission with a Type 1 configured grant and/or a Type 2 configured grant as described in clause 6.1.2.3 of TS 38.214 [19]

mcs-Table

Indicates the MCS table the UE shall use for PUSCH without transform precoding. If the field is absent the UE applies the value gam64.

mcs-TableTransformPrecoder

Indicates the MCS table the UE shall use for PUSCH with transform precoding. If the field is absent the UE applies the value qam64.

mcsAndTBS

The modulation order, target code rate and TB size (see TS 38.214 [19], clause 6.1.2). The NW does not configure the values 28~31 in this version of the specification.

nrofHARQ-Processes

The number of HARQ processes configured. It applies for both Type 1 and Type 2. See TS 38.321 [3], clause 5.4.1. If the UE is configured with *nrofHARQ-Processes-v1700, the* UE shall ignore *nrofHARQ-Processes* (without suffix).

pathlossReferenceIndex

Indicates the reference signal index used as PUSCH pathloss reference (see TS 38.213 [13], clause 7.1.1). In case of CG-SDT, the UE does not use this field.

pathlossReferenceIndex2

Indicates the reference signal used as PUSCH pathloss reference for the second SRS resource set. When this field is present, pathlossReferenceIndex indicates the reference signal used as PUSCH pathloss reference for the first SRS resource set

p0-PUSCH-Alpha

Index of the P0-PUSCH-AlphaSet to be used for this configuration.

p0-PUSCH-Alpha2

Index of the P0-PUSCH-AlphaSet to be used for second SRS resource set. If this field is present, the p0-PUSCH-Alpha provides index for the P0-PUSCH-AlphaSet to be used for first SRS resource set.

periodicity

Periodicity for UL transmission without UL grant for type 1 and type 2 (see TS 38.321 [3], clause 5.8.2). The following periodicities are supported depending on the configured subcarrier spacing [symbols]: 15 kHz: 2. 7. n*14. where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 320, 640}

30 kHz: 2, 7, n*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 640, 1280}

60 kHz with normal CP 2, 7, n*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1280, 2560} 60 kHz with ECP: 2, 6, n*12, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1280, 2560}

120 kHz: 2, 7, n*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1024, 1280, 2560, 5120} 480 and 960 kHz: 2, 7, n*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1024, 1280, 2560, 5120}

In case of SDT, the network does not configure periodicity values less than 5ms.

periodicityExt

This field is used to calculate the periodicity for UL transmission without UL grant for type 1 and type 2 (see TS 38.321 [3], clause 5.8.2). If this field is present, the field periodicity is ignored.

The following periodicites are supported depending on the configured subcarrier spacing [symbols]: 15 kHz: periodicityExt*14, where periodicityExt has a value between 1 and 640. 30 kHz: periodicityExt*14, where periodicityExt has a value between 1 and 1280. 60 kHz with normal CP: periodicityExt*14, where periodicityExt has a value between 1 and 2560. 60 kHz with ECP: periodicityExt*12, where periodicityExt has a value between 1 and 2560. 120 kHz: periodicityExt*14, where periodicityExt has a value between 1 and 5120. 120 kHz: periodicityExt*14, where periodicityExt has a value between 1 and 20480. 120 periodicityExt*14, where periodicityExt has a value between 1 and 40960.

In case of SDT, the network does not configure periodicity values less than 5ms.

phy-PriorityIndex

Indicates the PHY priority of CG PUSCH at least for PHY-layer collision handling. Value p0 indicates low priority and value p1 indicates high priority. The network does not configure this for CG-SDT.

powerControlLoopToUse

Closed control loop to apply (see TS 38.213 [13], clause 7.1.1).

powerControlLoopToUse2

Closed control loop to apply to second SRS resource set (see TS 38.213 [13], clause 7.1.1). If this field is present, the *powerControlLoopToUse* applies to the first SRS resource set.

precodingAndNumberOfLayers

Indicates the precoding and number of layers (see TS 38.212 [17], clause 7.3.1.1.2, and TS 38.214 [19], clause 6.1.2.3). In case of CG-SDT, network sets this field to 1.

precodingAndNumberOfLavers2

Indicates the precoding and number of layers for the second SRS resource set. When this field is present, *precodingAndNumberOfLayers* indicated the precoding and number of layers for the first SRS resource set.

pusch-RepTypeIndicator

Indicates whether UE follows the behavior for PUSCH repetition type A or the behavior for PUSCH repetition type B for each Type 1 configured grant configuration. The value pusch-RepTypeA enables the 'PUSCH repetition type A' and the value pusch-RepTypeB enables the 'PUSCH repetition type B' (see TS 38.214 [19], clause 6.1.2.3). The value pusch-RepTypeB is not configured simultaneously with cg-nrofPUSCH-InSlot-r16 and cg-nrofSlots-r16. The network does not configure this field if cg-RetransmissionTimer-r16 is configured for CG operation with shared spectrum channel access.

rbg-Size

Selection between configuration 1 and configuration 2 for RBG size for PUSCH. The UE does not apply this field if *resourceAllocation* is set to *resourceAllocationType1*. Otherwise, the UE applies the value *config1* when the field is absent. Note: *rbg-Size* is used when the *transformPrecoder* parameter is disabled.

repK-RV

The redundancy version (RV) sequence to use. See TS 38.214 [19], clause 6.1.2. The network configures this field if repetitions are used, i.e., if *repK* is set to *n*2, *n*4 or *n*8. This field is not configured when *cq-RetransmissionTimer* is configured. Otherwise, the field is absent.

repK

Number of repetitions K, see TS 38.214 [19]. If the field repK-v1710 is present, the UE shall ignore the repK (without suffix).

resourceAllocation

Configuration of resource allocation type 0 and resource allocation type 1. For Type 1 UL data transmission without grant, resourceAllocation should be resourceAllocationType0 or resourceAllocationType1.

rrc-ConfiguredUplinkGrant

Configuration for configured grant" transmission with fully RRC-configured UL grant (Type1). If this field is absent the UE uses UL grant configured by DCI addressed to CS-RNTI (Type2).

sequenceOffsetForRV

Configures the RV offset for the starting RV for the first repetition (first actual repetition in PUSCH repetition Type B) towards the second 'SRS resource set' for PUSCH configured in either srs-ResourceSetToAddModList or srs-ResourceSetToAddModListDCI-0-2 with usage 'codebook' or 'noncodebook'.

srs-ResourceIndicator

Indicates the SRS resource to be used. The network does not configure this for CG-SDT.

srs-ResourceIndicator2

Indicates the SRS resource to be used for the second SRS resource set. When this field is present, the srs-ResourceIndicator is used for the first SRS resource set.

startingFromRV0

This field is used to determine the initial transmission occasion of a transport block for a given RV sequence, see TS 38.214 [19], clause 6.1.2.3.1. The network does not configure this field if *cg-RetransmissionTimer-r16* is configured for CG operation.

timeDomainAllocation, timeDomainAllocation-v1710

Indicates a combination of start symbol and length and PUSCH mapping type, see TS 38.214 [19], clause 6.1.2 and TS 38.212 [17], clause 7.3.1.

If the field timeDomainAllocation-v1710 is present, the UE shall ignore timeDomainAllocation field (without suffix).

timeDomainOffset

Offset related to the reference SFN indicated by timeReferenceSFN, see TS 38.321 [3], clause 5.8.2. timeDomainOffset-r17 is only applicable to 480 kHz and 960 kHz. If timeDomainOffset-r17 is present, the UE shall ignore timeDomainOffset (without suffix).

timeReferenceSFN

Indicates SFN used for determination of the offset of a resource in time domain. The UE uses the closest SFN with the indicated number preceding the reception of the configured grant configuration, see TS 38.321 [3], clause 5.8.2. If the field *timeReferenceSFN* is not present, the reference SFN is 0.

transformPrecoder

Enables or disables transform precoding for *type1* and *type2*. If the field is absent, the UE enables or disables transform precoding in accordance with the field *msg3-transformPrecoder* in *RACH-ConfigCommon* from *rach-ConfigCommon* included directly within BWP configuration (i.e., not included in *additionalRACH-ConfigList*), see TS 38.214 [19], clause 6.1.3.

uci-OnPUSCH

Selection between and configuration of dynamic and semi-static beta-offset. For Type 1 UL data transmission without grant, *uci-OnPUSCH* should be set to *semiStatic*. The network does not configure this for CG-SDT.

CG-COT-Sharing field descriptions

channelAccessPriority

Indicates the Channel Access Priority Class that the gNB can assume when sharing the UE initiated COT (see 37.213 [48], clause 4.1.3).

duration

Indicates the number of DL transmission slots within UE initiated COT (see 37.213 [48], clause 4.1.3).

offset

Indicates the number of DL transmission slots from the end of the slot where CG-UCI is detected after which COT sharing can be used (see 37.213 [48], clause 4.1.3).

CG-StartingOffsets field descriptions

cg-StartingFullBW-InsideCOT

A set of configured grant PUSCH transmission starting offsets which indicates the length of a CP extension of the first symbol that is located before the configured resource when frequency domain resource allocation includes all interlaces in the allocated RB set(s) and the CG PUSCH resource is inside gNB COT (see TS 38.214 [19], clause 6.1.2.3).

cg-StartingFullBW-OutsideCOT

A set of configured grant PUSCH transmission starting offset indices (see TS 38.211[16], Table 5.3.1-2) which indicates the length of a CP extension of the first symbol that is located before the configured resource when frequency domain resource allocation includes all interlaces in the allocated RB set(s) and the CG PUSCH resource is outside gNB COT (see TS 38.214 [19], clause 6.1.2.3).

cg-StartingPartialBW-InsideCOT

A set of configured grant PUSCH transmission starting offset index (see TS 38.211[16], Table 5.3.1-2) which indicates the length of a CP extension of the first symbol that is located before the configured resource when frequency domain resource allocation does not include all interlaces in the allocated RB set(s) and the CG PUSCH resource is inside gNB COT (see TS 38.214 [19], clause 6.1.2.3).

cg-StartingPartialBW-OutsideCOT

A set of configured grant PUSCH transmission starting offset index (see TS 38.211[16], Table 5.3.1-2) which indicates the length of a CP extension of the first symbol that is located before the configured resource when frequency domain resource allocation does not include all interlaces in the allocated RB set(s) and the CG PUSCH resource is outside gNB COT (see TS 38.214 [19], clause 6.1.2.3).

CG-SDT-Configuration field descriptions

cg-SDT-RetransmissionTimer

Indicates the initial value of the configured grant retransmission timer used for the initial transmission of CG-SDT with CCCH message (see TS 38.321 [3]) in multiples of periodicity.

sdt-DMRS-Ports

Indicates the set of DMRS ports for SSB to PUSCH mapping (see TS 38.213 [13]).

sdt-NrofDMRS-Sequences

Indicates the number of DMRS sequences for SSB to PUSCH mapping (see TS 38.213 [13]).

sdt-SSB-Subset

Indicates SSB subset for SSB to CG PUSCH mapping within one CG configuration. If this field is absent, UE assumes the SSB set includes all actually transmitted SSBs configured by SIB1.

sdt-SSB-PerCG-PUSCH

The number of SSBs per CG PUSCH (see TS 38.213 [13]). Value one corresponds to 1 SSBs per CG PUSCH, value two corresponds to 2 SSBs per CG PUSCH and so on.

sdt-P0-PUSCH

Indicates P0 value for PUSCH for CG SDT in steps of 1dB (see TS 38.213 [13]). When this field is configured, the UE ignores the p0-PUSCH-Alpha.

sdt-Alpha

Indicates alpha value for PUSCH for CG SDT. *alpha0* indicates value 0 is used *alpha04* indicates value 4 is used and so on (see TS 38.213 [13]). When this field is configured, the UE ignores the *p0-PUSCH-Alpha*.

Conditional Presence	Explanation
LCH-BasedPrioritization	This field is optionally present, Need R, if <i>Ich-BasedPrioritization</i> is configured in the MAC entity. It is absent otherwise.
RepTypeB	The field is optionally present if pusch-RepTypeIndicator is set to pusch-RepTypeB, Need S, and absent otherwise.
CG-List	The field is mandatory present when included in configuredGrantConfigToAddModList-r16, otherwise the field is absent.
CG-IndexMAC	The field is mandatory present if at least one configured grant is configured by configuredGrantConfigToAddModList-r16 in
	any BWP of this MAC entity, otherwise it is optionally present, need R.
SRSsets	This field is mandatory present when UE is configured with two SRS sets configured in either srs-
	ResourceSetToAddModList or srs-ResourceSetToAddModListDCI-0-2 with usage codebook or non-codebook. Otherwise it
	is absent, Need R

ConfiguredGrantConfigIndex

The IE ConfiguredGrantConfigIndex is used to indicate the index of one of multiple UL Configured Grant configurations in one BWP.

ConfiguredGrantConfigIndex information element

- -- ASN1START
- -- TAG-CONFIGUREDGRANTCONFIGINDEX-START

ConfiguredGrantConfigIndex-r16 ::= INTEGER (0.. maxNrofConfiguredGrantConfig-1-r16)

- -- TAG-CONFIGUREDGRANTCONFIGINDEX-STOP
- -- ASN1STOP

ConfiguredGrantConfigIndexMAC

The IE ConfiguredGrantConfigIndexMAC is used to indicate the unique Configured Grant configurations index per MAC entity.

ConfiguredGrantConfigIndexMAC information element

```
-- ASN1START
-- TAG-CONFIGUREDGRANTCONFIGINDEXMAC-START

ConfiguredGrantConfigIndexMAC-r16 ::= INTEGER (0.. maxNrofConfiguredGrantConfigMAC-1-r16)

-- TAG-CONFIGUREDGRANTCONFIGINDEXMAC-STOP
-- ASN1STOP
```

ConnEstFailureControl

The IE ConnEstFailureControl is used to configure parameters for connection establishment failure control.

ConnEstFailureControl information element

ConnEstFailureControl field descriptions

connEstFailCount

-- ASN1STOP

Number of times that the UE detects T300 expiry on the same cell before applying connEstFailOffset.

connEstFailOffset

Parameter "Qoffset_{temp}" in TS 38.304 [20]. If the field is absent, the value of infinity shall be used for "Qoffset_{temp}".

connEstFailOffsetValidity

Amount of time that the UE applies *connEstFailOffset* before removing the offset from evaluation of the cell. Value *s30* corresponds to 30 seconds, value *s60* corresponds to 60 seconds, and so on.

ControlResourceSet

The IE *ControlResourceSet* is used to configure a time/frequency control resource set (CORESET) in which to search for downlink control information (see TS 38.213 [13], clause 10.1). For the UE not supporting *multipleCORESET* in FR1, in order to receive MBS multicast in CFR within the UE's active BWP, if a CORESET is not configured within the *PDCCH-ConfigMulticast*, the CORESET other than CORESET0 configured within the UE's active BWP for scheduling unicast can be used for scheduling MBS multicast, and the CORESET is expected to be included completely within the CFR and the parameters configured in the CORESET are expected to be supported by the UE for MBS multicast.

ControlResourceSet information element

```
-- ASN1START
-- TAG-CONTROLRESOURCESET-START
ControlResourceSet ::=
                                   SEQUENCE {
    controlResourceSetId
                                       ControlResourceSetId,
    frequencyDomainResources
                                       BIT STRING (SIZE (45)),
    duration
                                       INTEGER (1..maxCoReSetDuration),
    cce-REG-MappingType
                                       CHOICE {
        interleaved
                                            SEOUENCE {
           reg-BundleSize
                                                ENUMERATED {n2, n3, n6},
           interleaverSize
                                                ENUMERATED {n2, n3, n6},
           shiftIndex
                                                INTEGER(0..maxNrofPhysicalResourceBlocks-1)
                                                                                                  OPTIONAL -- Need S
       nonInterleaved
                                            NULL
    precoderGranularity
                                        ENUMERATED {sameAsREG-bundle, allContiguousRBs},
                                        SEQUENCE(SIZE (1..maxNrofTCI-StatesPDCCH)) OF TCI-StateId OPTIONAL, -- Cond NotSIB-initialBWP
    tci-StatesPDCCH-ToAddList
                                        SEQUENCE(SIZE (1..maxNrofTCI-StatesPDCCH)) OF TCI-StateId OPTIONAL, -- Cond NotSIB-initialBWP
    tci-StatesPDCCH-ToReleaseList
    tci-PresentInDCI
                                            ENUMERATED {enabled}
                                                                                                  OPTIONAL, -- Need S
    pdcch-DMRS-ScramblingID
                                            INTEGER (0..65535)
                                                                                                  OPTIONAL, -- Need S
    [ [
    rb-Offset-r16
                                        INTEGER (0..5)
                                                                                                  OPTIONAL, -- Need S
                                                                                                  OPTIONAL, -- Need S
    tci-PresentDCI-1-2-r16
                                        INTEGER (1..3)
                                                                                                  OPTIONAL, -- Need S
    coresetPoolIndex-r16
                                        INTEGER (0..1)
    controlResourceSetId-v1610
                                        ControlResourceSetId-v1610
                                                                                                  OPTIONAL -- Need S
    ]],
    1 1
                                         ENUMERATED {enabled}
    followUnifiedTCI-State-r17
                                                                                                   OPTIONAL -- Need R
    11
-- TAG-CONTROLRESOURCESET-STOP
-- ASN1STOP
```

ControlResourceSet field descriptions

555

cce-REG-MappingType

Mapping of Control Channel Elements (CCE) to Resource Element Groups (REG) (see TS 38.211 [16], clauses 7.3.2.2 and 7.4.1.3.2).

controlResourceSetId

Identifies the instance of the ControlResourceSet IE. Value 0 identifies the common CORESET configured in MIB and in ServingCellConfigCommon (controlResourceSetZero) and is hence not used here in the ControlResourceSet IE. Other values identify CORESETs configured by dedicated signalling or in SIB1 or SIB20. The controlResourceSetId is unique among the BWPs of a serving cell.

If the field controlResourceSetId-v1610 is present, the UE shall ignore the controlResourceSetId field (without suffix).

coresetPoolIndex

The index of the CORESET pool for this CORESET as specified in TS 38.213 [13] (clauses 9 and 10) and TS 38.214 [19] (clauses 5.1 and 6.1). If the field is absent, the UE applies the value 0.

duration

Contiguous time duration of the CORESET in number of symbols (see TS 38.211 [16], clause 7.3.2.2).

followUnifiedTCI-State

When set to enabled, for PDCCH reception on this CORESET, the UE applies the "indicated" DL only TCI or joint TCI as specified in TS 38.214 [19], clause 5.1.5.

frequencyDomainResources

Frequency domain resources for the CORESET. Each bit corresponds a group of 6 RBs, with grouping starting from the first RB group in the BWP or MBS CFR where the CORESET is configured. When at least one search space is configured with *freqMonitorLocation-r16*, only the first $N_{RBG,Set0}^{size}$ bits are valid (see TS 38.213 [13], clause 10.1). The first (left-most / most significant) bit corresponds to the first RB group in the BWP or MBS CFR where the CORESET is configured, and so on. A bit that is set to 1 indicates that this RB group belongs to the frequency domain resource of this CORESET. Bits corresponding to a group of RBs not fully contained in the bandwidth part within which the CORESET is configured are set to zero (see TS 38.211 [16], clause 7.3.2.2).

interleaverSize

Interleaver-size (see TS 38.211 [16], clause 7.3.2.2).

pdcch-DMRS-ScramblingID

PDCCH DMRS scrambling initialization (see TS 38.211 [16], clause 7.4.1.3.1). When the field is absent the UE applies the value of the *physCellId* configured for this serving cell.

precoderGranularity

Precoder granularity in frequency domain (see TS 38.211 [16], clauses 7.3.2.2 and 7.4.1.3.2).

rb-Offset

Indicates the RB level offset in units of RB from the first RB of the first 6RB group to the first RB of BWP (see 38.213 [13], clause 10.1).

reg-BundleSize

Resource Element Groups (REGs) can be bundled to create REG bundles. This parameter defines the size of such bundles (see TS 38.211 [16], clause 7.3.2.2).

shiftIndex

When the field is absent the UE applies the value of the *physCellId*configured for this serving cell (see TS 38.211 [16], clause 7.3.2.2).

tci-PresentInDCI

This field indicates if TCI field is present or absent in DCI format 1_1 and DCI format 4_2. When the field is absent the UE considers the TCI to be absent/disabled. In case of cross carrier scheduling, the network sets this field to enabled for the *ControlResourceSet* used for cross carrier scheduling in DCI format 1_1 in the scheduling cell if enableDefaultBeamForCCS is not configured (see TS 38.214 [19], clause 5.1.5).

tci-PresentDCI-1-2

Configures the number of bits for "Transmission configuration indicator" in DCI format 1_2. When the field is absent the UE applies the value of 0 bit for the "Transmission configuration indicator" in DCI format 1_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.5). In case of cross carrier scheduling, the network configures this field for the *ControlResourceSet* used for cross carrier scheduling in DCI format 1_2 in the scheduling cell if *enableDefaultBeamForCCS* is not configured (see TS 38.214 [19], clause 5.1.5).

tci-StatesPDCCH-ToAddList

A subset of the TCI states defined in *pdsch-Config*, either with *tci-StatesToAddModList* or *dl-OrJointTCI-StateList*, included in the *BWP-DownlinkDedicated* corresponding to the serving cell and to the DL BWP to which the *ControlResourceSet* belong to. They are used for providing QCL relationships between the DL RS(s) in one RS Set (TCI-State) and the PDCCH DMRS ports (see TS 38.213 [13], clause 6.). The network configures at most *maxNrofTCI-StatesPDCCH* entries. The QCL relationships defined herein do not apply to MBS broadcast.

Conditional Presence	Explanation
NotSIB-initialBWP	The field is absent in SIB1/SIB20 and in the PDCCH-ConfigCommon of the initial BWP in ServingCellConfigCommon, if SIB1/SIB20
	is broadcasted. Otherwise, it is optionally present, Need N.

ControlResourceSetId

The ControlResourceSetId IE concerns a short identity, used to identify a control resource set within a serving cell. The ControlResourceSetId = 0 identifies the ControlResourceSet#0 configured via PBCH (MIB) and in controlResourceSetZero (ServingCellConfigCommon). The ID space is used across the BWPs and MBS CFRs of a Serving Cell.

ControlResourceSetId information element

```
-- ASN1START
-- TAG-CONTROLRESOURCESETID-START

ControlResourceSetId ::= INTEGER (0..maxNrofControlResourceSets-1)

ControlResourceSetId-r16 ::= INTEGER (0..maxNrofControlResourceSets-1-r16)

ControlResourceSetId-v1610 ::= INTEGER (maxNrofControlResourceSets..maxNrofControlResourceSets-1-r16)

-- TAG-CONTROLRESOURCESETID-STOP
-- ASN1STOP
```

ControlResourceSetZero

The IE ControlResourceSetZero is used to configure CORESET#0 of the initial BWP (see TS 38.213 [13], clause 13).

ControlResourceSetZero information element

```
-- ASN1START
-- TAG-CONTROLRESOURCESETZERO-START

ControlResourceSetZero ::= INTEGER (0..15)

-- TAG-CONTROLRESOURCESETZERO-STOP
-- ASN1STOP
```

CrossCarrierSchedulingConfig

The IE CrossCarrierSchedulingConfig is used to specify the configuration when the cross-carrier scheduling is used in a cell.

CrossCarrierSchedulingConfig information element

```
-- ASN1START
-- TAG-CROSSCARRIERSCHEDULINGCONFIG-START
CrossCarrierSchedulingConfig ::=
                                        SEOUENCE {
    schedulingCellInfo
                                            CHOICE {
       own
                                                SEQUENCE {
                                                                            -- Cross carrier scheduling: scheduling cell
           cif-Presence
                                                    BOOLEAN
                                                SEOUENCE {
                                                                            -- Cross carrier scheduling: scheduled cell
       other
            schedulingCellId
                                                    ServCellIndex,
           cif-InSchedulingCell
                                                    INTEGER (1..7)
    . . . ,
    [ [
    carrierIndicatorSize-r16
        carrierIndicatorSizeDCI-1-2-r16
                                               INTEGER (0..3),
        carrierIndicatorSizeDCI-0-2-r16
                                               INTEGER (0..3)
                                                                                             OPTIONAL, -- Cond CIF-PRESENCE
    enableDefaultBeamForCCS-r16
                                        ENUMERATED {enabled}
                                                                                             OPTIONAL -- Need S
    ] ]
    ccs-BlindDetectionSplit-r17
                                        ENUMERATED {oneSeventh, threeFourteenth, twoSeventh, threeSeventh,
                                            oneHalf, fourSeventh, fiveSeventh, spare1}
                                                                                            OPTIONAL -- Need R
    ]]
-- TAG-CROSSCARRIERSCHEDULINGCONFIG-STOP
-- ASN1STOP
```

CrossCarrierSchedulingConfig field descriptions

carrierIndicatorSizeDCI-0-2, carrierIndicatorSizeDCI-1-2

Configures the number of bits for the field of carrier indicator in PDCCH DCI format 0_2/1_2. The field *carrierIndicatorSizeDCI-0-2* refers to DCI format 0_2 and the field *carrierIndicatorSizeDCI-1-2* refers to DCI format 1_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 10.1).

ccs-BlindDetectionSplit

Indicates the share of blind detection candidates and non-overlapping CCEs for PDCCH monitoring on an SpCell and an SCell when cross-carrier scheduling is configured from the SCell for the SpCell (see TS 38.213 [13], clause 10.1.1). The network only configures this field when it sets the field *other* for an SpCell, i.e., when it configures cross-carrier scheduling of the SpCell by a PDCCH on an Scell.

cif-Presence

The field is used to indicate whether carrier indicator field is present (value *true*) or not (value *false*) in PDCCH DCI formats, see TS 38.213 [13]. If *cif-Presence* is set to *true*, the CIF value indicating a grant or assignment for this cell is 0.

cif-InSchedulingCell

The field indicates the CIF value used in the scheduling cell to indicate a grant or assignment applicable for this cell, see TS 38.213 [13]. If configured for an SpCell, the non-fallback DCI formats on the SpCell include same number of CIF bits as the corresponding non-fallback DCI formats on the scheduling cell, and the CIF bits are considered reserved.

enableDefaultBeamForCCS

This field indicates whether default beam selection for cross-carrier scheduled PDSCH is enabled, see TS 38.214 [19]. If not present, the default beam selection behaviour is not applied, i.e. Rel-15 behaviour is applied. This field can only be configured in the cross-scheduled SCell or SpCell.

other

Parameters for cross-carrier scheduling. If configured for an SpCell, the SpCell can be scheduled by the PDCCH on another SCell as well as by the PDCCH on the SpCell. If configured for an SCell, the SCell is scheduled by a PDDCH on another cell.

own

Parameters for self-scheduling, i.e., a serving cell is scheduled by its own PDCCH.

schedulingCellId

If configured for an SpCell, this field indicates which SCell, in addition to the SpCell, signals the downlink allocations and uplink grants, if applicable, for the concerned SpCell. If configured for an Scell, this field indicates which cell signals the downlink allocations and uplink grants, if applicable, for the concerned SCell. In case the UE is configured with DC, the scheduling cell is part of the same cell group (i.e. MCG or SCG) as the scheduled cell. In case the UE is configured with two PUCCH groups, the scheduling cell and the scheduled cell are within the same PUCCH group. If drx-ConfigSecondaryGroup is configured in the MAC-CellGroupConfig associated with this serving cell, the scheduling cell and the scheduled cell belong to the same Frequency Range. In addition, the serving cell with an aperiodic CSI trigger and the PUSCH resource scheduled for the report are on the same carrier and serving cell, but the cell for which CSI is reported may belong to the same or a different Frequency Range. The network should not trigger a CSI request for a serving cell in the other Frequency Range when that serving cell is outside Active Time.

Conditional Presence	Explanation
CIF-PRESENCE	The field is mandatory present if the <i>cif-Presence</i> is set to <i>true</i> . The field is absent otherwise.

CSI-AperiodicTriggerStateList

The CSI-AperiodicTriggerStateList IE is used to configure the UE with a list of aperiodic trigger states. Each codepoint of the DCI field "CSI request" is associated with one trigger state (see TS 38.321 [3], clause 6.1.3.13). Upon reception of the value associated with a trigger state, the UE will perform measurement of CSI-RS, CSI-IM and/or SSB (reference signals) and aperiodic reporting on L1 according to all entries in the associatedReportConfigInfoList for that trigger state.

CSI-AperiodicTriggerStateList information element

```
-- TAG-CSI-APERIODICTRIGGERSTATELIST-START
CSI-AperiodicTriggerStateList ::=
                                   SEQUENCE (SIZE (1..maxNrOfCSI-AperiodicTriggers)) OF CSI-AperiodicTriggerState
CSI-AperiodicTriggerState ::=
                                    SEOUENCE {
                                        SEQUENCE (SIZE(1..maxNrofReportConfigPerAperiodicTrigger)) OF CSI-AssociatedReportConfigInfo,
    associatedReportConfigInfoList
    . . . ,
    11
    ap-CSI-MultiplexingMode-r17
                                        ENUMERATED {enabled}
                                                                                                      OPTIONAL -- Need R
CSI-AssociatedReportConfigInfo ::= SEQUENCE {
    reportConfiqId
                                        CSI-ReportConfigId,
    resourcesForChannel
                                        CHOICE {
       nzp-CSI-RS
                                            SEOUENCE {
           resourceSet
                                                INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig),
           gcl-info
                                                SEQUENCE (SIZE(1..maxNrofAP-CSI-RS-ResourcesPerSet)) OF TCI-StateId
                                                                                                      OPTIONAL -- Cond Aperiodic
        csi-SSB-ResourceSet
                                            INTEGER (1..maxNrofCSI-SSB-ResourceSetsPerConfig)
    csi-IM-ResourcesForInterference
                                        INTEGER(1..maxNrofCSI-IM-ResourceSetsPerConfig)
                                                                                                      OPTIONAL, -- Cond CSI-IM-ForInterference
    nzp-CSI-RS-ResourcesForInterference INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig)
                                                                                                      OPTIONAL, -- Cond NZP-CSI-RS-ForInterference
    ] ]
                                    CHOICE {
    resourcesForChannel2-r17
       nzp-CSI-RS2-r17
                                        SEOUENCE {
           resourceSet2-r17
                                            INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig),
           gcl-info2-r17
                                            SEQUENCE (SIZE(1..maxNrofAP-CSI-RS-ResourcesPerSet)) OF TCI-StateId
                                                                                                  OPTIONAL -- Cond Aperiodic
       csi-SSB-ResourceSet2-r17
                                        INTEGER (1..maxNrofCSI-SSB-ResourceSetsPerConfigExt)
                                                                                                  OPTIONAL, -- Cond NoUnifiedTCI
    csi-SSB-ResourceSetExt
                                    INTEGER (1..maxNrofCSI-SSB-ResourceSetsPerConfigExt)
                                                                                                  OPTIONAL -- Need R
    11
-- TAG-CSI-APERIODICTRIGGERSTATELIST-STOP
-- ASN1STOP
```

CSI-AssociatedReportConfigInfo field descriptions

ap-CSI-MultiplexingMode

Indicates if the behavior of transmitting aperiodic CSI on the first PUSCH repetitions corresponding to two SRS resource sets configured in srs-ResourceSetToAddModList or srs-ResourceSetToAddModListDCI-0-2 with usage 'codebook' or 'noncodebook' is enabled or not.

csi-IM-ResourcesForInterference

CSI-IM-ResourceSet for interference measurement. Entry number in csi-IM-ResourceSetList in the CSI-ResourceConfig indicated by csi-IM-ResourceSerInterference in the CSI-ReportConfig indicated by reportConfigId above (value 1 corresponds to the first entry, value 2 to the second entry, and so on). The indicated CSI-IM-ResourceSet should have exactly the same number of resourceSet like the NZP-CSI-RS-ResourceSet indicated in resourceSet within nzp-CSI-RS.

csi-SSB-ResourceSet, csi-SSB-ResourceSet2

CSI-SSB-ResourceSet for channel measurements. Entry number in csi-SSB-ResourceSetList in the CSI-ResourceConfig indicated by resourcesForChannelMeasurement in the CSI-ReportConfig indicated by reportConfigld above (value 1 corresponds to the first entry, value 2 to the second entry, and so on).

nzp-CSI-RS-ResourcesForInterference

NZP-CSI-RS-ResourceSet for interference measurement. Entry number in nzp-CSI-RS-ResourceSetList in the CSI-ResourceConfig indicated by nzp-CSI-RS-ResourceSetList in the CSI-ReportConfig indicated by reportConfigld above (value 1 corresponds to the first entry, value 2 to the second entry, and so on).

qcl-info, qcl-info2

List of references to TCI-States for providing the QCL source and QCL type for each NZP-CSI-RS-Resource listed in nzp-CSI-RS-Resources of the NZP-CSI-RS-ResourceSet indicated by resourceSet within nzp-CSI-RS. Each TCI-StateId refers to the TCI-State which has this value for tci-StateId and is defined in tci-StatesToAddModList in the PDSCH-Config included in the BWP-Downlink corresponding to the serving cell and to the DL BWP to which the resourcesForChannelMeasurement (in the CSI-ReportConfig indicated by reportConfigId above) belong to. First entry in qcl-info corresponds to first entry in nzp-CSI-RS-ResourceSet, second entry in qcl-info corresponds to second entry in nzp-CSI-RS-Resources, and so on (see TS 38.214 [19], clause 5.2.1.5.1). When this field is absent for aperiodic CSI RS, the UE shall use QCL information included in the "indicated" DL only/Joint TCI state as specified in TS 38.214

reportConfigld

The reportConfigId of one of the CSI-ReportConfigToAddMod configured in CSI-MeasConfig

resourcesForChannel2

Configures reference signals for channel measurement corresponding to the second resource set for L1-RSRP measurement as configured in IE *CSI-ResourceConfig* when *nrofReportedGroups-r17* is configured in IE *CSI-ReportConfig*. If this is present, network configures csi-SSB-ResourceSetExt instead of csi-SSB-ResourceSet and the UE ignores csi-SSB-ResourceSet in resourcesForChannel, and the *resourcesForChannel* configures the reference signals for channel measurement corresponding to the first resource set for L1-RSRP measurement (see TS 38.214 [19], clause 5.2.1.4).

resourceSet

NZP-CSI-RS-ResourceSet for channel measurements. Entry number in nzp-CSI-RS-ResourceSetList in the CSI-ResourceConfig indicated by resourcesForChannelMeasurement in the CSI-ReportConfig indicated by reportConfigId above (value 1 corresponds to the first entry, value 2 to the second entry, and so on).

Conditional Presence	Explanation
Aperiodic	The field is mandatory present if the NZP-CSI-RS-Resources in the associated resourceSet have the resourceType aperiodic and unifiedTCI-StateType is not configured. The field is optionally present, Need R, if the NZP-CSI-RS-Resources in the associated resourceSet have the resourceType aperiodic and unifiedTCI-StateType is configured. The field is absent otherwise.
CSI-IM-ForInterference	This field is mandatory present if the CSI-ReportConfig identified by reportConfigId is configured with csi-IM-ResourcesForInterference; otherwise it is absent.
NZP-CSI-RS-ForInterference	This field is mandatory present if the CSI-ReportConfig identified by reportConfigld is configured with nzp-CSI-RS-ResourcesForInterference; otherwise it is absent.
NoUnifiedTCI	This field is absent, Need R, if <i>unifiedTCI-StateType</i> is configured for the serving cell in which the <i>CSI-AperiodicTriggerStateList</i> is included. It is optionally present, Need R, otherwise.

CSI-FrequencyOccupation

The IE CSI-FrequencyOccupation is used to configure the frequency domain occupation of a channel state information measurement resource (e.g. NZP-CSI-RS-Resource, CSI-IM-Resource).

CSI-FrequencyOccupation information element

CSI-FrequencyOccupation field descriptions

nrofRBs

Number of PRBs across which this CSI resource spans. Only multiples of 4 are allowed. The smallest configurable number is the minimum of 24 and the width of the associated BWP. If the configured value is larger than the width of the corresponding BWP, the UE shall assume that the actual CSI-RS bandwidth is equal to the width of the BWP.

startingRB

PRB where this CSI resource starts in relation to common resource block #0 (CRB#0) on the common resource block grid. Only multiples of 4 are allowed (0, 4, ...)

CSI-IM-Resource

The IE CSI-IM-Resource is used to configure one CSI Interference Management (IM) resource.

CSI-IM-Resource information element

```
-- ASN1START
-- TAG-CSI-IM-RESOURCE-START
CSI-IM-Resource ::=
                                   SEQUENCE {
                                       CSI-IM-ResourceId,
    csi-IM-ResourceId
                                          CHOICE {
    csi-IM-ResourceElementPattern
       pattern0
                                               SEQUENCE {
           subcarrierLocation-p0
                                                   ENUMERATED { s0, s2, s4, s6, s8, s10 },
           symbolLocation-p0
                                                   INTEGER (0..12)
       pattern1
                                               SEOUENCE {
           subcarrierLocation-p1
                                                   ENUMERATED { s0, s4, s8 },
           symbolLocation-p1
                                                   INTEGER (0..13)
```

```
}
freqBand
periodicityAndOffset
CSI-FrequencyOccupation
periodicityAndOffset

TAG-CSI-IM-RESOURCE-STOP
ASN1STOP
```

```
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Cond PeriodicOrSemiPersistent.
```

CSI-IM-Resource field descriptions

csi-IM-ResourceElementPattern

The resource element pattern (Pattern0 (2,2) or Pattern1 (4,1)) with corresponding parameters (see TS 38.214 [19], clause 5.2.2.4)

freqBand

Frequency-occupancy of CSI-IM (see TS 38.214 [19], clause 5.2.2.4)

periodicityAndOffset

Periodicity and slot offset for periodic/semi-persistent CSI-IM. Network always configures the UE with a value for this field for periodic and semi-persistent CSI-IM-Resources (as indicated in CSI-ResourceConfig). A change of configuration between periodic or semi-persistent and aperiodic for a CSI-IM-Resource is not supported without a release and add.

subcarrierLocation-p0

OFDM subcarrier occupancy of the CSI-IM resource for Pattern0 (see TS 38.214 [19], clause 5.2.2.4)

subcarrierLocation-p1

OFDM subcarrier occupancy of the CSI-IM resource for Pattern1 (see TS 38.214 [19], clause 5.2.2.4)

symbolLocation-p0

OFDM symbol location of the CSI-IM resource for Pattern0 (see TS 38.214 [19], clause 5.2.2.4)

symbolLocation-p1

OFDM symbol location of the CSI-IM resource for Pattern1 (see TS 38.214 [19], clause 5.2.2.4)

Conditional Presence	Explanation
PeriodicOrSemiPersistent	The field is optionally present, Need M, for periodic and semi-persistent CSI-IM-Resources (as indicated in CSI-
	ResourceConfig). The field is absent otherwise.

CSI-IM-Resourceld

The IE CSI-IM-ResourceId is used to identify one CSI-IM-Resource.

CSI-IM-Resourceld information element

```
-- ASN1START
-- TAG-CSI-IM-RESOURCEID-START

CSI-IM-ResourceId ::= INTEGER (0..maxNrofCSI-IM-Resources-1)

-- TAG-CSI-IM-RESOURCEID-STOP
-- ASN1STOP
```

CSI-IM-ResourceSet

The IE CSI-IM-ResourceSet is used to configure a set of one or more CSI Interference Management (IM) resources (their IDs) and set-specific parameters.

CSI-IM-ResourceSet information element

```
-- ASN1START
-- TAG-CSI-IM-RESOURCESET-START

CSI-IM-ResourceSet ::= SEQUENCE {
    csi-IM-ResourceSetId CSI-IM-ResourceSetId,
    sei-IM-Resources SEQUENCE (SIZE(1..maxNrofCSI-IM-ResourceSPerSet)) OF CSI-IM-ResourceId,
    ...
}
-- TAG-CSI-IM-RESOURCESET-STOP
-- ASN1STOP
```

CSI-IM-ResourceSet field descriptions

csi-IM-Resources

CSI-IM-Resources associated with this CSI-IM-ResourceSet (see TS 38.214 [19], clause 5.2).

CSI-IM-ResourceSetId

The IE CSI-IM-ResourceSetId is used to identify CSI-IM-ResourceSets.

CSI-IM-ResourceSetId information element

```
-- ASN1START
-- TAG-CSI-IM-RESOURCESETID-START

CSI-IM-ResourceSetId ::= INTEGER (0..maxNrofCSI-IM-ResourceSets-1)

-- TAG-CSI-IM-RESOURCESETID-STOP
-- ASN1STOP
```

CSI-MeasConfig

The IE *CSI-MeasConfig* is used to configure CSI-RS (reference signals) belonging to the serving cell in which *CSI-MeasConfig* is included, channel state information reports to be transmitted on PUCCH on the serving cell in which *CSI-MeasConfig* is included and channel state information reports on PUSCH triggered by DCI received on the serving cell in which *CSI-MeasConfig* is included. See also TS 38.214 [19], clause 5.2.

CSI-MeasConfig information element

-- ASN1START

```
-- TAG-CSI-MEASCONFIG-START
CSI-MeasConfig ::=
                                    SEQUENCE {
    nzp-CSI-RS-ResourceToAddModList
                                        SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-Resources)) OF NZP-CSI-RS-Resource OPTIONAL, -- Need N
    nzp-CSI-RS-ResourceToReleaseList
                                        SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-Resources)) OF NZP-CSI-RS-ResourceId OPTIONAL, -- Need N
    nzp-CSI-RS-ResourceSetToAddModList SEOUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourceSets)) OF NZP-CSI-RS-ResourceSet
                                                                                                                   OPTIONAL, -- Need N
    nzp-CSI-RS-ResourceSetToReleaseList SEOUENCE (SIZE (1...maxNrofNZP-CSI-RS-ResourceSets)) OF NZP-CSI-RS-ResourceSetId
                                                                                                                   OPTIONAL, -- Need N
    csi-IM-ResourceToAddModList
                                        SEOUENCE (SIZE (1..maxNrofCSI-IM-Resources)) OF CSI-IM-Resource
                                                                                                                   OPTIONAL, -- Need N
    csi-IM-ResourceToReleaseList
                                        SEQUENCE (SIZE (1..maxNrofCSI-IM-Resources)) OF CSI-IM-ResourceId
                                                                                                                   OPTIONAL, -- Need N
    csi-IM-ResourceSetToAddModList
                                        SEQUENCE (SIZE (1..maxNrofCSI-IM-ResourceSets)) OF CSI-IM-ResourceSet
                                                                                                                   OPTIONAL, -- Need N
                                                                                                                  OPTIONAL, -- Need N
    csi-IM-ResourceSetToReleaseList
                                        SEOUENCE (SIZE (1..maxNrofCSI-IM-ResourceSets)) OF CSI-IM-ResourceSetId
    csi-SSB-ResourceSetToAddModList
                                        SEQUENCE (SIZE (1..maxNrofCSI-SSB-ResourceSets)) OF CSI-SSB-ResourceSet
                                                                                                                  OPTIONAL, -- Need N
    csi-SSB-ResourceSetToReleaseList
                                        SEQUENCE (SIZE (1..maxNrofCSI-SSB-ResourceSets)) OF CSI-SSB-ResourceSetId OPTIONAL, -- Need N
    csi-ResourceConfigToAddModList
                                        SEQUENCE (SIZE (1..maxNrofCSI-ResourceConfigurations)) OF CSI-ResourceConfig
                                                                                                                   OPTIONAL, -- Need N
    csi-ResourceConfigToReleaseList
                                        SEQUENCE (SIZE (1..maxNrofCSI-ResourceConfigurations)) OF CSI-ResourceConfigId
                                                                                                                   OPTIONAL, -- Need N
    csi-ReportConfigToAddModList
                                        SEQUENCE (SIZE (1..maxNrofCSI-ReportConfigurations)) OF CSI-ReportConfig OPTIONAL, -- Need N
    csi-ReportConfigToReleaseList
                                        SEQUENCE (SIZE (1..maxNrofCSI-ReportConfigurations)) OF CSI-ReportConfigId
                                                                                                                   OPTIONAL, -- Need N
                                        INTEGER (0..6)
    reportTriggerSize
                                                                                                                   OPTIONAL, -- Need M
    aperiodicTriggerStateList
                                        SetupRelease { CSI-AperiodicTriggerStateList }
                                                                                                                   OPTIONAL, -- Need M
                                                                                                                   OPTIONAL, -- Need M
    semiPersistentOnPUSCH-TriggerStateList
                                              SetupRelease { CSI-SemiPersistentOnPUSCH-TriggerStateList }
    . . . ,
    ] ]
    reportTriggerSizeDCI-0-2-r16
                                        INTEGER (0..6)
                                                                                                                   OPTIONAL -- Need R
    ]],
    [ [
    sCellActivationRS-ConfigToAddModList-r17 SEQUENCE (SIZE (1..maxNrofSCellActRS-r17)) OF SCellActivationRS-Config-r17 OPTIONAL, -- Need N
    sCellActivationRS-ConfigToReleaseList-r17 SEQUENCE (SIZE (1..maxNrofSCellActRS-r17)) OF SCellActivationRS-ConfigId-r17 OPTIONAL -- Need N
    11
-- TAG-CSI-MEASCONFIG-STOP
-- ASN1STOP
```

CSI-MeasConfig field descriptions

aperiodicTriggerStateList

Contains trigger states for dynamically selecting one or more aperiodic and semi-persistent reporting configurations and/or triggering one or more aperiodic CSI-RS resource sets for channel and/or interference measurement (see TS 38.214 [19], clause 5.2.1).

csi-IM-ResourceSetToAddModList

Pool of CSI-IM-ResourceSet which can be referred to from CSI-ResourceConfig or from MAC CEs.

csi-IM-ResourceToAddModList

Pool of CSI-IM-Resource which can be referred to from CSI-IM-ResourceSet.

csi-ReportConfigToAddModList

Configured CSI report settings as specified in TS 38.214 [19] clause 5.2.1.1.

csi-ResourceConfigToAddModList

Configured CSI resource settings as specified in TS 38.214 [19] clause 5.2.1.2.

csi-SSB-ResourceSetToAddModList

Pool of CSI-SSB-ResourceSet which can be referred to from CSI-ResourceConfig.

nzp-CSI-RS-ResourceSetToAddModList

Pool of NZP-CSI-RS-ResourceSet which can be referred to from CSI-ResourceConfig or from MAC CEs.

nzp-CSI-RS-ResourceToAddModList

Pool of NZP-CSI-RS-Resource which can be referred to from NZP-CSI-RS-ResourceSet.

reportTriggerSize, reportTriggerSizeDCI-0-2

Size of CSI request field in DCI (bits) (see TS 38.214 [19], clause 5.2.1.5.1). The field reportTriggerSize applies to DCI format 0_1 and the field reportTriggerSizeDCI-0-2 applies to DCI format 0_2 (see TS 38.214 [19], clause 5.2.1.5.1).

scellActivationRS-ConfigToAddModList

Configured RS for fast SCell activation as specified in TS 38.214 [19] clause x.y.z.

CSI-ReportConfig

The IE *CSI-ReportConfig* is used to configure a periodic or semi-persistent report sent on PUCCH on the cell in which the *CSI-ReportConfig* is included, or to configure a semi-persistent or aperiodic report sent on PUSCH triggered by DCI received on the cell in which the *CSI-ReportConfig* is included (in this case, the cell on which the report is sent is determined by the received DCI). See TS 38.214 [19], clause 5.2.1.

CSI-ReportConfig information element

```
-- ASN1START
-- TAG-CSI-REPORTCONFIG-START
CSI-ReportConfig ::=
                                   SEOUENCE {
    reportConfigId
                                           CSI-ReportConfigId,
                                           ServCellIndex
    carrier
                                                                           OPTIONAL, -- Need S
    resourcesForChannelMeasurement
                                           CSI-ResourceConfigId,
                                           CSI-ResourceConfiqId
    csi-IM-ResourcesForInterference
                                                                           OPTIONAL, -- Need R
    nzp-CSI-RS-ResourcesForInterference
                                           CSI-ResourceConfigId
                                                                           OPTIONAL. -- Need R
    reportConfigType
                                           CHOICE {
       periodic
                                               SEQUENCE {
                                                   CSI-ReportPeriodicityAndOffset,
           reportSlotConfig
           pucch-CSI-ResourceList
                                                   SEOUENCE (SIZE (1..maxNrofBWPs)) OF PUCCH-CSI-Resource
```

```
semiPersistentOnPUCCH
                                            SEOUENCE {
       reportSlotConfig
                                                CSI-ReportPeriodicityAndOffset,
       pucch-CSI-ResourceList
                                                SEQUENCE (SIZE (1..maxNrofBWPs)) OF PUCCH-CSI-Resource
   semiPersistentOnPUSCH
                                            SEOUENCE {
                                                ENUMERATED {s15, s110, s120, s140, s180, s1160, s1320},
       reportSlotConfig
       reportSlotOffsetList
                                            SEQUENCE (SIZE (1.. maxNrofUL-Allocations)) OF INTEGER(0..32),
       p0alpha
                                                P0-PUSCH-AlphaSetId
   aperiodic
                                            SEOUENCE {
       reportSlotOffsetList
                                            SEQUENCE (SIZE (1..maxNrofUL-Allocations)) OF INTEGER(0..32)
reportQuantity
                                        CHOICE {
   none
                                            NULL,
   cri-RI-PMI-COI
                                            NULL,
   cri-RI-i1
                                            NULL,
   cri-RI-i1-CQI
                                            SEOUENCE {
                                                ENUMERATED {n2, n4}
       pdsch-BundleSizeForCSI
                                                                                                             OPTIONAL
                                                                                                                         -- Need S
   cri-RI-CQI
                                            NULL,
   cri-RSRP
                                            NULL,
   ssb-Index-RSRP
                                            NULL,
   cri-RI-LI-PMI-COI
                                            NULL
reportFreqConfiguration
                                        SEOUENCE {
   cgi-FormatIndicator
                                            ENUMERATED { widebandCOI, subbandCOI
                                                                                                             OPTIONAL,
                                                                                                                         -- Need R
   pmi-FormatIndicator
                                            ENUMERATED { widebandPMI, subbandPMI
                                                                                                             OPTIONAL,
                                                                                                                         -- Need R
   csi-ReportingBand
                                            CHOICE {
       subbands3
                                                BIT STRING(SIZE(3)),
       subbands4
                                                BIT STRING(SIZE(4)),
       subbands5
                                                BIT STRING(SIZE(5)),
       subbands6
                                                BIT STRING(SIZE(6)),
       subbands7
                                                BIT STRING(SIZE(7)),
       subbands8
                                                BIT STRING(SIZE(8)),
       subbands9
                                                BIT STRING(SIZE(9)),
       subbands10
                                                BIT STRING(SIZE(10)),
       subbands11
                                                BIT STRING(SIZE(11)),
       subbands12
                                                BIT STRING(SIZE(12)),
        subbands13
                                                BIT STRING(SIZE(13)),
       subbands14
                                                BIT STRING(SIZE(14)),
       subbands15
                                                BIT STRING(SIZE(15)),
       subbands16
                                                BIT STRING(SIZE(16)),
       subbands17
                                                BIT STRING(SIZE(17)),
       subbands18
                                                BIT STRING(SIZE(18)),
        subbands19-v1530
                                                BIT STRING(SIZE(19))
       OPTIONAL
                  -- Need S
                                                                                                             OPTIONAL, -- Need R
timeRestrictionForChannelMeasurements
                                                ENUMERATED {configured, notConfigured},
timeRestrictionForInterferenceMeasurements
                                                ENUMERATED {configured, notConfigured},
codebookConfig
                                                CodebookConfig
                                                                                                             OPTIONAL,
                                                                                                                        -- Need R
                                                ENUMERATED {n1, n2}
                                                                                                             OPTIONAL,
                                                                                                                         -- Need R
dummy
```

```
groupBasedBeamReporting
                                            CHOICE {
   enabled
                                                 NULL,
    disabled
                                                 SEOUENCE {
                                                 ENUMERATED {n1, n2, n3, n4}
       nrofReportedRS
                                                                                                              OPTIONAL
                                                                                                                          -- Need S
cgi-Table
                            ENUMERATED {table1, table2, table3, table4-r17}
                                                                                                                  OPTIONAL.
                                                                                                                              -- Need R
                            ENUMERATED {value1, value2},
subbandSize
non-PMI-PortIndication
                            SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourcesPerConfig)) OF PortIndexFor8Ranks OPTIONAL, -- Need R
. . . .
] ]
semiPersistentOnPUSCH-v1530
                                    SEOUENCE {
    reportSlotConfig-v1530
                                        ENUMERATED {sl4, sl8, sl16}
                                                                                                              OPTIONAL
                                                                                                                          -- Need R
]],
] ]
semiPersistentOnPUSCH-v1610
                                    SEOUENCE {
    reportSlotOffsetListDCI-0-2-r16
                                        SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)
                                                                                                                            -- Need R
                                                                                                              OPTIONAL,
    reportSlotOffsetListDCI-0-1-r16
                                        SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)
                                                                                                              OPTIONAL
                                                                                                                            -- Need R
                                                                                                              OPTIONAL,
                                                                                                                            -- Need R
aperiodic-v1610
                                    SEQUENCE {
   reportSlotOffsetListDCI-0-2-r16
                                        SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)
                                                                                                              OPTIONAL,
                                                                                                                            -- Need R
    reportSlotOffsetListDCI-0-1-r16
                                        SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)
                                                                                                              OPTIONAL
                                                                                                                            -- Need R
                                                                                                              OPTIONAL,
                                                                                                                            -- Need R
                                    CHOICE {
reportQuantity-r16
  cri-SINR-r16
                                        NULL,
                                        NULL
   ssb-Index-SINR-r16
                                                                                                              OPTIONAL,
                                                                                                                          -- Need R
codebookConfig-r16
                                            CodebookConfig-r16
                                                                                                              OPTIONAL
                                                                                                                          -- Need R
]],
11
                                    ENUMERATED {bits4}
cqi-BitsPerSubband-r17
                                                                                                              OPTIONAL,
                                                                                                                          -- Need R
groupBasedBeamReporting-v1710
                                    SEQUENCE {
   nrofReportedGroups-r17
                                        ENUMERATED {n1, n2, n3, n4}
                                                                                                              OPTIONAL.
                                                                                                                          -- Need R
codebookConfig-r17
                                    CodebookConfig-r17
                                                                                                              OPTIONAL,
                                                                                                                          -- Need R
sharedCMR-r17
                                    ENUMERATED {enable}
                                                                                                              OPTIONAL,
                                                                                                                          -- Need R
csi-ReportMode-r17
                                    ENUMERATED {mode1, mode2}
                                                                                                              OPTIONAL,
                                                                                                                          -- Need R
                                    ENUMERATED {n0, n1, n2}
numberOfSingleTRP-CSI-Mode1-r17
                                                                                                              OPTIONAL,
                                                                                                                          -- Need R
reportOuantity-r17
                                    CHOICE {
    cri-RSRP-Index-r17
                                        NULL,
    ssb-Index-RSRP-Index-r17
                                        NULL.
    cri-SINR-Index-r17
                                        NULL,
    ssb-Index-SINR-Index-r17
                                        NULL
                                                                                                              OPTIONAL
                                                                                                                          -- Need R
]],
11
semiPersistentOnPUSCH-v1720
                                    SEOUENCE {
    reportSlotOffsetList-r17
                                        SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128)
                                                                                                                          -- Need R
                                                                                                              OPTIONAL,
    reportSlotOffsetListDCI-0-2-r17
                                        SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128)
                                                                                                              OPTIONAL,
                                                                                                                          -- Need R
    reportSlotOffsetListDCI-0-1-r17
                                        SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128)
                                                                                                              OPTIONAL
                                                                                                                          -- Need R
                                                                                                              OPTIONAL,
                                                                                                                          -- Need R
aperiodic-v1720
                                    SEOUENCE {
    reportSlotOffsetList-r17
                                        SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128) OPTIONAL,
```

```
reportSlotOffsetListDCI-0-2-r17
                                            SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128) OPTIONAL,
                                                                                                                              -- Need R
       reportSlotOffsetListDCI-0-1-r17
                                            SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128)
                                                                                                                 OPTIONAL
                                                                                                                              -- Need R
                                                                                                                  OPTIONAL
                                                                                                                              -- Need R
    ]],
    ΓΓ
    codebookConfig-v1730
                                        CodebookConfig-v1730
                                                                                                                  OPTIONAL
                                                                                                                              -- Need R
CSI-ReportPeriodicityAndOffset ::= CHOICE {
    slots4
                                        INTEGER(0..3),
    slots5
                                        INTEGER(0..4),
    slots8
                                        INTEGER(0..7),
    slots10
                                        INTEGER (0..9).
    slots16
                                        INTEGER(0..15),
    slots20
                                        INTEGER(0..19),
    slots40
                                        INTEGER(0..39),
    slots80
                                        INTEGER(0..79),
    slots160
                                        INTEGER(0..159),
    slots320
                                        INTEGER(0..319)
PUCCH-CST-Resource ::=
                                    SEQUENCE {
    uplinkBandwidthPartId
                                        BWP-Id,
    pucch-Resource
                                        PUCCH-ResourceId
PortIndexFor8Ranks ::=
                                    CHOICE {
    portIndex8
                                        SEOUENCE {
        rank1-8
                                            PortIndex8
                                                                                                              OPTIONAL,
                                                                                                                          -- Need R
       rank2-8
                                                                                                                          -- Need R
                                            SEQUENCE(SIZE(2)) OF PortIndex8
                                                                                                             OPTIONAL,
       rank3-8
                                            SEQUENCE(SIZE(3)) OF PortIndex8
                                                                                                             OPTIONAL,
                                                                                                                         -- Need R
                                                                                                                         -- Need R
       rank4-8
                                            SEQUENCE(SIZE(4)) OF PortIndex8
                                                                                                             OPTIONAL,
                                                                                                                         -- Need R
       rank5-8
                                            SEQUENCE(SIZE(5)) OF PortIndex8
                                                                                                             OPTIONAL,
       rank6-8
                                                                                                                          -- Need R
                                            SEOUENCE(SIZE(6)) OF PortIndex8
                                                                                                             OPTIONAL,
       rank7-8
                                            SEQUENCE(SIZE(7)) OF PortIndex8
                                                                                                             OPTIONAL,
                                                                                                                         -- Need R
        rank8-8
                                            SEQUENCE(SIZE(8)) OF PortIndex8
                                                                                                              OPTIONAL
                                                                                                                          -- Need R
   portIndex4
                                        SEQUENCE {
       rank1-4
                                            PortIndex4
                                                                                                              OPTIONAL,
                                                                                                                          -- Need R
                                                                                                                          -- Need R
       rank2-4
                                                                                                              OPTIONAL,
                                            SEQUENCE(SIZE(2)) OF PortIndex4
       rank3-4
                                                                                                                          -- Need R
                                            SEQUENCE(SIZE(3)) OF PortIndex4
                                                                                                              OPTIONAL,
       rank4-4
                                            SEQUENCE(SIZE(4)) OF PortIndex4
                                                                                                              OPTIONAL
                                                                                                                          -- Need R
    portIndex2
                                        SEOUENCE {
       rank1-2
                                            PortIndex2
                                                                                                             OPTIONAL,
                                                                                                                         -- Need R
                                            SEQUENCE(SIZE(2)) OF PortIndex2
       rank2-2
                                                                                                             OPTIONAL
                                                                                                                          -- Need R
    portIndex1
                                        NULL
PortIndex8::=
                                    INTEGER (0..7)
PortIndex4::=
                                    INTEGER (0..3)
PortIndex2::=
                                    INTEGER (0..1)
```

- -- TAG-CSI-REPORTCONFIG-STOP
- -- ASN1STOP

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CSI-ReportConfig field descriptions

carrier

Indicates in which serving cell the CSI-ResourceConfig indicated below are to be found. If the field is absent, the resources are on the same serving cell as this report configuration.

codebookConfig

Codebook configuration for Type-1 or Type-2 including codebook subset restriction. Network can only configure one of *codebookConfig*, *codebookConfig-r16* or *codebookConfig-r17* to a UE. The network includes *codebookConfig-v1730* only if *codebookConfig-r17* is configured.

cgi-BitsPerSubband

This field can only be present if *cqi-FormatIndicator* is set to *subbandCQI*. If the field is configured with *bits4*, the UE uses 4-bit sub-band CQI. If the field is not present and *cqi-FormatIndicator* is set to *subbandCQI*, the UE uses 2-bit sub-band differential CQI.

cgi-FormatIndicator

Indicates whether the UE shall report a single (wideband) or multiple (subband) CQI (see TS 38.214 [19], clause 5.2.1.4).

cqi-Table

Which CQI table to use for CQI calculation (see TS 38.214 [19], clause 5.2.2.1). For a RedCap UE, CQI table 2 is only supported if the UE indicates support of 256QAM for PDSCH.

csi-IM-ResourcesForInterference

CSI IM resources for interference measurement. csi-ResourceConfigld of a CSI-ResourceConfig included in the configuration of the serving cell indicated with the field "carrier" above. The CSI-ResourceConfig indicated here contains only CSI-IM resources. The bwp-Id in that CSI-ResourceConfig is the same value as the bwp-Id in the CSI-ResourceConfig indicated by resourcesForChannelMeasurement.

csi-ReportingBand

Indicates a contiguous or non-contiguous subset of subbands in the bandwidth part which CSI shall be reported for. Each bit in the bit-string represents one subband. The right-most bit in the bit string represents the lowest subband in the BWP. The choice determines the number of subbands (subbands3 for 3 subbands, subbands4 for 4 subbands, and so on) (see TS 38.214 [19], clause 5.2.1.4). This field is absent if there are less than 24 PRBs (no sub band) and present otherwise (see TS 38.214 [19], clause 5.2.1.4).

csi-ReportMode

Configures the CSI report modes Mode1 or Mode 2 (see TS 38.214 [19], clause 5.2.1.4.2)

dummy

This field is not used in the specification. If received it shall be ignored by the UE.

groupBasedBeamReporting

Turning on/off group beam based reporting (see TS 38.214 [19], clause 5.2.1.4). If groupBasedBeamReporting (without suffix) is set to disabled, groupBasedBeamReporting-v1710 is absent.

non-PMI-PortIndication

Port indication for RI/CQI calculation. For each CSI-RS resource in the linked ResourceConfig for channel measurement, a port indication for each rank R, indicating which R ports to use. Applicable only for non-PMI feedback (see TS 38.214 [19], clause 5.2.1.4.2).

The first entry in non-PMI-PortIndication corresponds to the NZP-CSI-RS-Resource indicated by the first entry in nzp-CSI-RS-Resources in the NZP-CSI-RS-ResourceSet indicated in the first entry of nzp-CSI-RS-ResourceSetList of the CSI-ResourceConfig whose CSI-ResourceConfigld is indicated in a CSI-Measld together with the above CSI-ReportConfigld; the second entry in non-PMI-PortIndication corresponds to the NZP-CSI-RS-Resource indicated by the second entry in nzp-CSI-RS-Resources in the NZP-CSI-RS-ResourceSet indicated in the first entry of nzp-CSI-RS-ResourceSetList of the same CSI-ResourceConfig, and so on until the NZP-CSI-RS-Resource indicated by the last entry in nzp-CSI-RS-ResourceSetList of the same CSI-ResourceSetList of the same CSI-ResourceSetList of the same CSI-ResourceSetList of the same CSI-ResourceSet indicated in the first entry in nzp-CSI-RS-ResourceSet indicated in the second entry of nzp-CSI-RS-ResourceSetList of the same CSI-ResourceSetList of the same CSI-ResourceSetList of the same CSI-ResourceConfig and so on.

nrofReportedGroups

Number of reported resource groups per CSI-report. Value *n1* means one resource group, *n2* means 2 resource groups, and so on. If *nrofReportedGroups* is configured, the UE ignores groupBasedBeamReporting (without suffix).

nrofReportedRS

The number (N) of measured RS resources to be reported per report setting in a non-group-based report. N <= N_max, where N_max is either 2 or 4 depending on UE capability.

(see TS 38.214 [19], clause 5.2.1.4) When the field is absent the UE applies the value 1.

numberOfSingleTRP-CSI-Mode1

Configures the number of reported X CSIs when csi-ReportMode is set to 'Mode 1' as described in TS 38.214 [19], clause 5.2.1.4.2. The field is present only if csi-ReportMode configures Mode 1.

nzp-CSI-RS-ResourcesForInterference

NZP CSI RS resources for interference measurement. csi-ResourceConfigld of a CSI-ResourceConfig included in the configuration of the serving cell indicated with the field "carrier" above. The CSI-ResourceConfig indicated here contains only NZP-CSI-RS resources. The bwp-Id in that CSI-ResourceConfig is the same value as the bwp-Id in the CSI-ResourceConfig indicated by resourcesForChannelMeasurement.

p0alpha

Index of the p0-alpha set determining the power control for this CSI report transmission (see TS 38.214 [19], clause 6.2.1.2).

pdsch-BundleSizeForCSI

PRB bundling size to assume for CQI calculation when *reportQuantity* is CRI/RI/i1/CQI. If the field is absent, the UE assumes that no PRB bundling is applied (see TS 38.214 [19], clause 5.2.1.4.2).

pmi-FormatIndicator

Indicates whether the UE shall report a single (wideband) or multiple (subband) PMI. (see TS 38.214 [19], clause 5.2.1.4).

pucch-CSI-ResourceList

Indicates which PUCCH resource to use for reporting on PUCCH.

reportConfigType

Time domain behavior of reporting configuration.

reportFreqConfiguration

Reporting configuration in the frequency domain. (see TS 38.214 [19], clause 5.2.1.4).

reportQuantity

The CSI related quantities to report. see TS 38.214 [19], clause 5.2.1. If the field reportQuantity-r16 or reportQuantity-r17 is present, UE shall ignore reportQuantity (without suffix). Network does not configure reportQuantity-r17 together with reportQuantity-r16.

reportSlotConfia

Periodicity and slot offset (see TS 38.214 [19], clause 5.2.1.4). If the field *reportSlotConfig-v1530* is present, the UE shall ignore the value provided in *reportSlotConfig* (without suffix).

reportSlotOffsetList, reportSlotOffsetListDCI-0-1, reportSlotOffsetListDCI-0-2

Timing offset Y for semi persistent reporting using PUSCH. This field lists the allowed offset values. This list must have the same number of entries as the *pusch-TimeDomainAllocationList* in *PUSCH-Config.* A particular value is indicated in DCI. The network indicates in the DCI field of the UL grant, which of the configured report slot offsets the UE shall apply. The DCI value 0 corresponds to the first report slot offset in this list, the DCI value 1 corresponds to the second report slot offset in this list, and so on. The first report is transmitted in slot n+Y, second report in n+Y+P, where P is the configured periodicity.

Timing offset Y for aperiodic reporting using PUSCH. This field lists the allowed offset values. This list must have the same number of entries as the *pusch-TimeDomainAllocationList* in *PUSCH-Config*. A particular value is indicated in DCI. The network indicates in the DCI field of the UL grant, which of the configured report slot offsets the UE shall apply. The DCI value 0 corresponds to the first report slot offset in this list, the DCI value 1 corresponds to the second report slot offset in this list, and so on (see TS 38.214 [19], clause 6.1.2.1).

The field reportSlotOffsetListDCI-0-1 applies to DCI format 0_1 and the field reportSlotOffsetListDCI-0-2 applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.2.1). The fields reportSlotOffsetList-r17, reportSlotOffsetListDCI-0-1-r17 and reportSlotOffsetListDCI-0-2-r17 are only applicable for SCS 480 kHz and 960 kHz and if they are configured, the UE shall ignore the fields reportSlotOffsetList (without suffix), reportSlotOffsetListDCI-0-1 (without suffix) and reportSlotOffsetListDCI-0-2 (without suffix) for SCS 480 kHz and 960 kHz.

resourcesForChannelMeasurement

Resources for channel measurement. csi-ResourceConfigld of a CSI-ResourceConfig included in the configuration of the serving cell indicated with the field "carrier" above. The CSI-ResourceConfig indicated here contains only NZP-CSI-RS resources and/or SSB resources. This CSI-ReportConfig is associated with the DL BWP indicated by bwp-Id in that CSI-ResourceConfig.

sharedCMR

Enables sharing of channel measurement resources between different CSI measurement hypotheses when (1) csi-ReportMode is set to 'Mode1' and numberOfSingleTRP-CSI-Mode1 is set to 1 or 2; or (2) csi-ReportMode is set to 'Mode2' (see TS 38.214 [19], clause 5.2.1.4.2).

subbandSize

Indicates one out of two possible BWP-dependent values for the subband size as indicated in TS 38.214 [19], table 5.2.1.4-2 . If csi-ReportingBand is absent, the UE shall ignore this field.

timeRestrictionForChannelMeasurements

Time domain measurement restriction for the channel (signal) measurements (see TS 38.214 [19], clause 5.2.1.1).

timeRestrictionForInterferenceMeasurements

Time domain measurement restriction for interference measurements (see TS 38.214 [19], clause 5.2.1.1).

PortIndexFor8Ranks field descriptions

portIndex8

Port-Index configuration for up to rank 8. If present, the network configures port indexes for at least one of the ranks.

portIndex4

Port-Index configuration for up to rank 4. If present, the network configures port indexes for at least one of the ranks.

portIndex2

Port-Index configuration for up to rank 2. If present, the network configures port indexes for at least one of the ranks.

portIndex1

Port-Index configuration for rank 1.

PUCCH-CSI-Resource field descriptions

pucch-Resource

PUCCH resource for the associated uplink BWP. Only PUCCH-Resource of format 2, 3 and 4 is supported. The actual PUCCH-Resource is configured in *PUCCH-Config* and referred to by its ID. When two *PUCCH-Config* are configured within *PUCCH-ConfigurationList*, *PUCCH-ResourceId* in a *PUCCH-CSI-Resource* refers to a PUCCH-Resource in the *PUCCH-Config* used for HARQ-ACK with low priority.

– CSI-ReportConfigld

The IE CSI-ReportConfigId is used to identify one CSI-ReportConfig.

CSI-ReportConfigId information element

```
-- ASN1START
```

-- TAG-CSI-REPORTCONFIGID-START

CSI-ReportConfigId ::=

INTEGER (0..maxNrofCSI-ReportConfigurations-1)

- -- TAG-CSI-REPORTCONFIGID-STOP
- -- ASN1STOP

CSI-ResourceConfig

The IE CSI-ResourceConfig defines a group of one or more NZP-CSI-RS-ResourceSet, CSI-IM-ResourceSet and/or CSI-SSB-ResourceSet.

CSI-ResourceConfig information element

```
-- ASN1START
-- TAG-CSI-RESOURCECONFIG-START
CSI-ResourceConfig ::=
                           SEQUENCE {
    csi-ResourceConfiqId
                                CSI-ResourceConfigId,
    csi-RS-ResourceSetList
                                CHOICE {
       nzp-CSI-RS-SSB
                                    SEQUENCE {
           nzp-CSI-RS-ResourceSetList SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig)) OF NZP-CSI-RS-ResourceSetId
                                                                                                                            OPTIONAL, -- Need R
                                        SEQUENCE (SIZE (1..maxNrofCSI-SSB-ResourceSetsPerConfig)) OF CSI-SSB-ResourceSetId OPTIONAL -- Need R
            csi-SSB-ResourceSetList
        csi-IM-ResourceSetList
                                    SEQUENCE (SIZE (1..maxNrofCSI-IM-ResourceSetsPerConfig)) OF CSI-IM-ResourceSetId
    bwp-Id
                                BWP-Id,
                                ENUMERATED { aperiodic, semiPersistent, periodic },
    resourceType
    . . . ,
    ] ]
    csi-SSB-ResourceSetListExt-r17
                                        CSI-SSB-ResourceSetId
                                                                                                               OPTIONAL -- Need R
    11
-- TAG-CSI-RESOURCECONFIG-STOP
-- ASN1STOP
```

CSI-ResourceConfig field descriptions

bwp-ld

The DL BWP which the CSI-RS associated with this CSI-ResourceConfig are located in (see TS 38.214 [19], clause 5.2.1.2.

csi-IM-ResourceSetList

List of references to CSI-IM resources used for CSI measurement and reporting in a CSI-RS resource set. Contains up to *maxNrofCSI-IM-ResourceSetsPerConfig* resource sets if *resourceType* is 'aperiodic' and 1 otherwise (see TS 38.214 [19], clause 5.2.1.2).

csi-ResourceConfigId

Used in CSI-ReportConfig to refer to an instance of CSI-ResourceConfig.

csi-SSB-ResourceSetList, csi-SSB-ResourceSetListExt

List of references to SSB resources used for CSI measurement and reporting in a CSI-RS resource set (see TS 38.214 [19], clause 5.2.1.2). The csi-SSB-ResourceSetListExt provides additional references and can only be configured if csi-SSB-ResourceSetList is configured and groupBasedBeamReporting-v1710 is configured in the CSI-ReportConfig that indicates this CSI-ResourceConfig as resourcesForChannelMeasurement. If groupBasedBeamReporting-v1710 is configured in the IE CSI-ReportConfig that indicates this CSI-ResourceConfig as resourceForChannelMeasurement, the network configures 2 resource sets, which may be two NZP CSI-RS resource sets, two CSI SSB resource sets or one NZP CSI-RS resource set and one CSI-SSB resource set (see TS 38.214 [19], clause 5.2.1.2 and 5.2.1.4.2). In this case, in TS 38.212 [17] Table 6.3.1.1.2-8B:

- if the list has one CSI-SSB resource set, this resource set is indicated by a resource set indicator set to 1, while the resource set indicator of the NZP CSI-RS resource set is 0:
- if the list has two CSI-SSB resource sets, the first resource set is indicated by a resource set indicator set to 0 and the second resource set by a resource set indicator set to 1.

nzp-CSI-RS-ResourceSetList

List of references to NZP CSI-RS resources used for beam measurement and reporting in a CSI-RS resource set.

If resourceType is set to 'aperiodic', the network configures up to maxNrofNZP-CSI-RS-ResourceSetsPerConfig resource sets. If resourceType is is set to 'periodic' or 'semiPersistent' and groupBasedBeamReporting-v1710 is not configured in IE CSI-ReportConfig, the network configures 1 resource set. If resourceType is set to 'periodic' or 'semiPersistent' and groupBasedBeamReporting-v1710 is configured, the network configures 2 resource sets, which may be two NZP CSI-RS resource sets, two CSI SSB resource sets or one NZP CSI-RS resource set and one CSI-SSB resource set (see TS 38.214 [19], clause 5.2.1.2 and 5.2.1.4.2). In this case, in TS 38.212 [17] Table 6.3.1.1.2-8B, the following applies:

- if the list has one NZP CSI-RS resource set, this resource set is indicated by a resource set indicator set to 0;
- if the list has two NZP CSI-RS resource sets, the first resource set is indicated by a resource set indicator set to 0 and the second resource set by a resource set indicator set to 1.

resourceTvpe

Time domain behavior of resource configuration (see TS 38.214 [19], clause 5.2.1.2). It does not apply to resources provided in the csi-SSB-ResourceSetList.

CSI-ResourceConfigld

The IE CSI-ResourceConfigId is used to identify a CSI-ResourceConfig.

CSI-ResourceConfigId information element

```
-- ASN1START
-- TAG-CSI-RESOURCECONFIGID-START

CSI-ResourceConfigId ::= INTEGER (0..maxNrofCSI-ResourceConfigurations-1)

-- TAG-CSI-RESOURCECONFIGID-STOP
-- ASN1STOP
```

CSI-ResourcePeriodicityAndOffset

The IE CSI-ResourcePeriodicityAndOffset is used to configure a periodicity and a corresponding offset for periodic and semi-persistent CSI resources, and for periodic and semi-persistent reporting on PUCCH. both, the periodicity and the offset are given in number of slots. The periodicity value slots4 corresponds to 4 slots, value slots5 corresponds to 5 slots, and so on.

CSI-ResourcePeriodicityAndOffset information element

```
-- ASN1START
-- TAG-CSI-RESOURCEPERIODICITYANDOFFSET-START
CSI-ResourcePeriodicityAndOffset ::= CHOICE {
    slots4
                                            INTEGER (0..3),
    slots5
                                            INTEGER (0..4),
    slots8
                                            INTEGER (0..7),
    slots10
                                            INTEGER (0..9),
    slots16
                                            INTEGER (0..15),
    slots20
                                            INTEGER (0..19),
    slots32
                                            INTEGER (0..31),
    slots40
                                            INTEGER (0..39),
    slots64
                                            INTEGER (0..63),
    slots80
                                            INTEGER (0..79),
    slots160
                                            INTEGER (0..159),
    slots320
                                            INTEGER (0..319),
    slots640
                                            INTEGER (0..639)
-- TAG-CSI-RESOURCEPERIODICITYANDOFFSET-STOP
-- ASN1STOP
```

CSI-RS-ResourceConfigMobility

The IE CSI-RS-ResourceConfigMobility is used to configure CSI-RS based RRM measurements.

CSI-RS-ResourceConfigMobility information element

```
CSI-RS-CellMobility ::=
                                    SEQUENCE {
    cellId
                                        PhysCellId,
    csi-rs-MeasurementBW
                                        SEOUENCE {
       nrofPRBs
                                            ENUMERATED { size24, size48, size96, size192, size264},
        startPRB
                                            INTEGER(0..2169)
    },
                                        ENUMERATED {d1,d3}
    density
                                                                                                                 OPTIONAL, -- Need R
                                        SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesRRM)) OF CSI-RS-Resource-Mobility
    csi-rs-ResourceList-Mobility
CSI-RS-Resource-Mobility ::=
                                    SEQUENCE {
    csi-RS-Index
                                        CSI-RS-Index,
    slotConfig
                                        CHOICE {
        ms4
                                            INTEGER (0..31),
        ms5
                                            INTEGER (0..39),
        ms10
                                            INTEGER (0..79),
        ms20
                                            INTEGER (0..159),
        ms40
                                            INTEGER (0..319)
    associatedSSB
                                        SEQUENCE {
       ssb-Index
                                            SSB-Index,
        isQuasiColocated
                                            BOOLEAN
                                                                                                                 OPTIONAL, -- Need R
    frequencyDomainAllocation
                                        CHOICE {
        row1
                                            BIT STRING (SIZE (4)),
        row2
                                            BIT STRING (SIZE (12))
    firstOFDMSymbolInTimeDomain
                                        INTEGER (0..13),
    sequenceGenerationConfig
                                        INTEGER (0..1023),
    . . . ,
    ] ]
    slotConfig-r17
                                        CHOICE {
        ms4
                                            INTEGER (0..255),
        ms5
                                            INTEGER (0..319),
        ms10
                                            INTEGER (0..639),
        ms20
                                            INTEGER (0..1279),
        ms40
                                            INTEGER (0..2559)
                                                                                                                 OPTIONAL -- Need R
    ]]
CSI-RS-Index ::=
                                    INTEGER (0..maxNrofCSI-RS-ResourcesRRM-1)
-- TAG-CSI-RS-RESOURCECONFIGMOBILITY-STOP
-- ASN1STOP
```

CSI-RS-CellMobility field descriptions

csi-rs-ResourceList-Mobility

List of CSI-RS resources for mobility. The maximum number of CSI-RS resources that can be configured per *measObjectNR* depends on the configuration of *associatedSSB* and the support of *increasedNumberofCSIRSPerMO* capability (see TS 38.214 [19], clause 5.1.6.1.3).

density

Frequency domain density for the 1-port CSI-RS for L3 mobility. See TS 38.211 [16], clause 7.4.1.

nrofPRBs

Allowed size of the measurement BW in PRBs. See TS 38.211 [16], clause 7.4.1.

startPRB

Starting PRB index of the measurement bandwidth. See TS 38.211 [16], clause 7.4.1.

CSI-RS-ResourceConfigMobility field descriptions

csi-RS-CellList-Mobility

List of cells for CSI-RS based RRM measurements.

refServCellIndex

Indicates the serving cell providing the timing reference for CSI-RS resources without associatedSSB. The field may be present only if there is at least one CSI-RS resource configured without associatedSSB. If this field is absent, the UE shall use the timing of the PCell for measurements on the CSI-RS resources without associatedSSB. The CSI-RS resources and the serving cell indicated by refServCellIndex for timing reference should be located in the same band.

subcarrierSpacing

Subcarrier spacing of CSI-RS.

Only the following values are applicable depending on the used frequency:

FR1: 15, 30, or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

CSI-RS-Resource-Mobility field descriptions

associatedSSB

If this field is present, the UE may base the timing of the CSI-RS resource indicated in *CSI-RS-Resource-Mobility* on the timing of the cell indicated by the *cellId* in the *CSI-RS-CellMobility*. In this case, the UE is not required to monitor that CSI-RS resource if the UE cannot detect the SS/PBCH block indicated by this *associatedSSB* and *cellId*. If this field is absent, the UE shall base the timing of the CSI-RS resource indicated in *CSI-RS-Resource-Mobility* on the timing of the serving cell indicated by *refServCellIndex*. In this case, the UE is required to measure the CSI-RS resource even if SS/PBCH block(s) with *cellId* in the *CSI-RS-CellMobility* are not detected.

CSI-RS resources with and without *associatedSSB* may be configured in accordance with the rules in TS 38.214 [19], clause 5.1.6.1.3.

csi-RS-Index

CSI-RS resource index associated to the CSI-RS resource to be measured (and used for reporting).

firstOFDMSymbolInTimeDomain

Time domain allocation within a physical resource block. The field indicates the first OFDM symbol in the PRB used for CSI-RS, see TS 38.211 [16], clause 7.4.1.5.3.

frequencyDomainAllocation

Frequency domain allocation within a physical resource block in accordance with TS 38.211 [16], clause 7.4.1.5.3 including table 7.4.1.5.2-1. The number of bits that may be set to one depend on the chosen row in that table.

isQuasiColocated

Indicates that the CSI-RS resource is quasi co-located with the associated SS/PBCH block, see TS 38.214 [19], clause 5.1.6.1.3.

sequenceGenerationConfig

Scrambling ID for CSI-RS (see TS 38.211 [16], clause 7.4.1.5.2).

slotConfig

Indicates the CSI-RS periodicity (in milliseconds) and for each periodicity the offset (in number of slots). When *subcarrierSpacing* is set to *kHz15*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 3/4/9/19/39 slots. When *subcarrierSpacing* is set to *kHz30*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 7/9/19/39/79 slots. When *subcarrierSpacing* is set to *kHz60*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 31/39/79/159/319 slots. When *subcarrierSpacing* is set to *kHz480*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 127/159/319/639/1279 slots. When *subcarrierSpacing* is set to *kHz960*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 255/319/639/1279/2559 slots. If *slotConfig-r17* is present, UE shall ignore the *slotConfig* (without suffix).

CSI-RS-ResourceMapping

The IE CSI-RS-ResourceMapping is used to configure the resource element mapping of a CSI-RS resource in time- and frequency domain.

CSI-RS-ResourceMapping information element

```
-- ASN1START
-- TAG-CSI-RS-RESOURCEMAPPING-START
CSI-RS-ResourceMapping ::=
                                    SEQUENCE {
    frequencyDomainAllocation
                                       CHOICE {
       row1
                                           BIT STRING (SIZE (4)).
       row2
                                            BIT STRING (SIZE (12)),
       row4
                                            BIT STRING (SIZE (3)),
        other
                                            BIT STRING (SIZE (6))
                                        ENUMERATED {p1,p2,p4,p8,p12,p16,p24,p32},
    nrofPorts
    firstOFDMSymbolInTimeDomain
                                        INTEGER (0..13),
    firstOFDMSymbolInTimeDomain2
                                        INTEGER (2..12)
                                                                                                                OPTIONAL, -- Need R
    cdm-Type
                                        ENUMERATED {noCDM, fd-CDM2, cdm4-FD2-TD2, cdm8-FD2-TD4},
```

CSI-RS-ResourceMapping field descriptions

cdm-Type

CDM type (see TS 38.214 [19], clause 5.2.2.3.1).

density

Density of CSI-RS resource measured in RE/port/PRB (see TS 38.211 [16], clause 7.4.1.5.3).

Values 0.5 (*dot5*), 1 (*one*) and 3 (*three*) are allowed for X=1, values 0.5 (*dot5*) and 1 (*one*) are allowed for X=2, 16, 24 and 32, value 1 (*one*) is allowed for X=4, 8, 12. For density = 1/2, includes 1-bit indication for RB level comb offset indicating whether odd or even RBs are occupied by CSI-RS.

firstOFDMSvmbolInTimeDomain2

Time domain allocation within a physical resource block. See TS 38.211 [16], clause 7.4.1.5.3.

firstOFDMSvmbolInTimeDomain

Time domain allocation within a physical resource block. The field indicates the first OFDM symbol in the PRB used for CSI-RS. See TS 38.211 [16], clause 7.4.1.5.3.

fregBand

Wideband or partial band CSI-RS, (see TS 38.214 [19], clause 5.2.2.3.1).

frequencyDomainAllocation

Frequency domain allocation within a physical resource block in accordance with TS 38.211 [16], clause 7.4.1.5.3. The applicable row number in table 7.4.1.5.3-1 is determined by the *frequencyDomainAllocation* for rows 1, 2 and 4, and for other rows by matching the values in the column Ports, Density and CDMtype in table 7.4.1.5.3-1 with the values of *nrofPorts*, *cdm-Type* and density below and, when more than one row has the 3 values matching, by selecting the row where the column (k bar, I bar) in table 7.4.1.5.3-1 has indexes for k ranging from 0 to 2*n-1 where n is the number of bits set to 1 in *frequencyDomainAllocation*.

nrofPorts

Number of ports (see TS 38.214 [19], clause 5.2.2.3.1).

CSI-SemiPersistentOnPUSCH-TriggerStateList

The CSI-SemiPersistentOnPUSCH-TriggerStateList IE is used to configure the UE with list of trigger states for semi-persistent reporting of channel state information on L1. See also TS 38.214 [19], clause 5.2.

CSI-SemiPersistentOnPUSCH-TriggerStateList information element

```
-- ASN1START
-- TAG-CSI-SEMIPERSISTENTONPUSCHTRIGGERSTATELIST-START
```

CSI-SemiPersistentOnPUSCH-TriggerStateList ::= SEOUENCE(SIZE (1..maxNrOfSemiPersistentPUSCH-TriggerS)) OF CSI-SemiPersistentOnPUSCH-TriggerState

CSI-SemiPersistentOnPUSCH-TriggerStateList field descriptions

sp-CSI-MultiplexingMode

Indicates if the behavior of transmitting SP-CSI on the first PUSCH repetitions coresponding to two SRS resource sets configured in srs-ResourceSetToAddModList or srs-ResourceSetToAddModListDCI-0-2 with usage 'codebook' or 'noncodebook' is enabled or not.

CSI-SSB-ResourceSet

The IE CSI-SSB-ResourceSet is used to configure one SS/PBCH block resource set which refers to SS/PBCH as indicated in ServingCellConfigCommon and ServingCellConfig.

CSI-SSB-ResourceSet information element

CSI-SSB-ResourceSet field descriptions

servingAdditionalPCIList

Indicates the physical cell IDs (PCI) of the SSBs in the *csi-SSB-ResourceList*. If present, the list has the same number of entries as *csi-SSB-ResourceList*. The first entry of the list indicates the value of the PCI for the first entry of *csi-SSB-ResourceList*, the second entry of this list indicates the value of the PCI for the second entry of *csi-SSB-ResourceList*, and so on. For each entry, the following applies:

- If the value is zero, the PCI is the PCI of the serving cell in which this CSI-SSB-ResourceSet is defined;
- otherwise, the value is additionalPCIIndex-r17 of an SSB-MTC-AdditionalPCI-r17 configured using the additionalPCI-ToAddModList-r17 in ServingCellConfig, and the PCI is the additionalPCI-r17 in this SSB-MTC-AdditionalPCI-r17.

CSI-SSB-ResourceSetId

The IE CSI-SSB-ResourceSetId is used to identify one SS/PBCH block resource set.

CSI-SSB-Resourceld information element

```
-- ASN1START
-- TAG-CSI-SSB-RESOURCESETID-START

CSI-SSB-ResourceSetId ::= INTEGER (0..maxNrofCSI-SSB-ResourceSets-1)

-- TAG-CSI-SSB-RESOURCESETID-STOP
-- ASN1STOP
```

DedicatedNAS-Message

The IE DedicatedNAS-Message is used to transfer UE specific NAS layer information between the 5GC CN and the UE. The RRC layer is transparent for this information.

DedicatedNAS-Message information element

```
-- ASN1START
-- TAG-DEDICATED-NAS-MESSAGE-START

DedicatedNAS-Message ::= OCTET STRING
-- TAG-DEDICATED-NAS-MESSAGE-STOP
-- ASN1STOP
```

- DL-PPW-PreConfig

The IE *DL-PPW-PreConfig* provides configuration for a measurement window where a UE is expected to measure the DL PRS, if it is inside the active DL BWP and with the same numerology as the active DL BWP. Based upon the indication received in the configuration, the UE identifies whether the DL PRS priority is higher than that of the other DL signals or channels and accordingly determines, for example, the UE is expected to measure the DL PRS and is not expected to receive other DL signals and channels.

OPTIONAL, -- Cond MultiType

OPTIONAL -- Cond MultiState

DL-PPW-PreConfig information element

```
-- ASN1START
-- TAG-DL-PPW-PRECONFIG-START
DL-PPW-PreConfig-r17 ::= SEQUENCE {
    dl-PPW-ID-r17 DL-PPW-ID-r17,
    dl-PPW-PeriodicityAndStartSlot-r17
                                           DL-PPW-PeriodicityAndStartSlot-r17,
   length-r17
                                             INTEGER (1..160),
    type-r17
                                             ENUMERATED {type1A, type1B, type2}
                                             ENUMERATED {st1, st2, st3}
    priority-r17
DL-PPW-ID-r17 ::= INTEGER (0..maxNrofPPW-ID-1-r17)
DL-PPW-PeriodicityAndStartSlot-r17 ::= CHOICE {
    scs15
                                             CHOICE {
                      n4
                                                 INTEGER (0..3),
                      n5
                                                 INTEGER (0..4),
                      n8
                                                 INTEGER (0..7),
                      n10
                                                 INTEGER (0..9),
                      n16
                                                 INTEGER (0..15),
                      n20
                                                 INTEGER (0..19),
                      n32
                                                 INTEGER (0..31),
                      n40
                                                 INTEGER (0..39),
                                                 INTEGER (0..63),
                      n64
                                                 INTEGER (0..79),
                      n80
                      n160
                                                 INTEGER (0..159),
                      n320
                                                 INTEGER (0..319),
                      n640
                                                 INTEGER (0..639),
                      n1280
                                                 INTEGER (0..1279),
                      n2560
                                                 INTEGER (0..2559),
                      n5120
                                                 INTEGER (0..5119),
                      n10240
                                                 INTEGER (0..10239),
                     . . .
    scs30
                                             CHOICE {
                      n8
                                                 INTEGER (0..7),
                                                 INTEGER (0..9),
                      n10
                      n16
                                                 INTEGER (0..15),
                      n20
                                                 INTEGER (0..19),
                      n32
                                                 INTEGER (0..31),
                      n40
                                                 INTEGER (0..39),
                      n64
                                                 INTEGER (0..63),
                      n80
                                                 INTEGER (0..79),
                      n128
                                                 INTEGER (0..127),
                      n160
                                                 INTEGER (0..159),
                      n320
                                                 INTEGER (0..319),
                      n640
                                                 INTEGER (0..639),
                      n1280
                                                 INTEGER (0..1279),
                      n2560
                                                 INTEGER (0..2559),
                      n5120
                                                 INTEGER (0..5119),
                      n10240
                                                 INTEGER (0..10239),
                      n20480
                                                 INTEGER (0..20479),
```

```
. . .
    },
    scs60
                                              CHOICE {
                      n16
                                                   INTEGER (0..15),
                      n20
                                                  INTEGER (0..19),
                      n32
                                                  INTEGER (0..31),
                      n40
                                                  INTEGER (0..39),
                      n64
                                                  INTEGER (0..63),
                      n80
                                                  INTEGER (0..79),
                                                  INTEGER (0..127),
                      n128
                      n160
                                                  INTEGER (0..159),
                      n256
                                                  INTEGER (0..255),
                      n320
                                                  INTEGER (0..319),
                      n640
                                                  INTEGER (0..639),
                      n1280
                                                  INTEGER (0..1279),
                      n2560
                                                  INTEGER (0..2559),
                      n5120
                                                  INTEGER (0..5119),
                      n10240
                                                  INTEGER (0..10239),
                                                  INTEGER (0..20479),
                      n20480
                                                  INTEGER (0..40959),
                      n40960
                       . . .
    scs120
                                              CHOICE {
                                                  INTEGER (0..31),
                      n32
                      n40
                                                  INTEGER (0..39),
                      n64
                                                  INTEGER (0..63),
                      n80
                                                  INTEGER (0..79),
                      n128
                                                  INTEGER (0..127),
                      n160
                                                  INTEGER (0..159),
                      n256
                                                  INTEGER (0..255),
                      n320
                                                   INTEGER (0..319),
                      n512
                                                  INTEGER (0..511),
                      n640
                                                  INTEGER (0..639),
                      n1280
                                                  INTEGER (0..1279),
                      n2560
                                                  INTEGER (0..2559),
                      n5120
                                                  INTEGER (0..5119),
                      n10240
                                                  INTEGER (0..10239),
                      n20480
                                                  INTEGER (0..20479),
                      n40960
                                                  INTEGER (0..40959),
                      n81920
                                                  INTEGER (0..81919),
                      . . .
    },
-- TAG-DL-PPW-PRECONFIG-STOP
-- ASN1STOP
```

DL-PPW-PreConfig field descriptions

dI-PPW-ID

Indicates the pre-configured ID for DL-PRS processing window configuration.

dI-PPW-PeriodicityAndStartSlot

Indicates the periodicity in slots and the offset of the starting slot with respect to SFN #0 slot #0 of the serving cell where the DL-PRS processing window is configured.

length

Indicates the length of DL-PRS processing window in slots. Value 1 indicates length of one slot, value 2 indicates length of two slots and so on.

priority

-- ASN1STOP

Indicates the priority between PDCCH/PDSCH/CSI-RS and PRS as specified in TS 38.214 [19].

type

Indicates the DL-PRS processing window type as specified in TS 38.214 [19].

Conditional Presence	Explanation
MultiType	The field is mandatory present when the UE reports its capability on supporting multiple processing types, otherwise it is absent.
MultiState	The field is mandatory present when the UE reports its capability on supporting option 1 or option 2 for the configured type,
	otherwise it is absent.

DMRS-BundlingPUCCH-Config

The IE DMRS-BundlingPUCCH-Config-r17 is used to configure DMRS bundling for PUCCH.

DMRS-BundlingPUCCH-Config information element

```
-- ASN1START
-- TAG-DMRS-BUNDLINGPUCCH-CONFIG-START
DMRS-BundlingPUCCH-Config-r17 ::=
                                         SEOUENCE {
                                             ENUMERATED {enabled}
    pucch-DMRS-Bundling-r17
                                                                                                            OPTIONAL, -- Need R
   pucch-TimeDomainWindowLength-r17
                                             INTEGER (2..8)
                                                                                                            OPTIONAL,
                                                                                                                       -- Need S
                                             ENUMERATED {enabled}
   pucch-WindowRestart-r17
                                                                                                            OPTIONAL,
                                                                                                                       -- Need R
   pucch-FrequencyHoppingInterval-r17
                                            ENUMERATED {s2, s4, s5, s10}
                                                                                                            OPTIONAL, -- Need S
-- TAG-DMRS-BUNDLINGPUCCH-CONFIG-STOP
```

DMRS-BundlingPUCCH-Config field descriptions

pucch-DMRS-Bundling

Indicates whether DMRS bundling and time domain window for PUCCH are jointly enabled.

pucch-FrequencyHoppingInterval

Configures the number of consecutive slots for the UE to perform inter-slot frequency hopping with inter-slot bundling for PUCCH. When both inter-frequency hopping and DMRS bundling are enabled for PUCCH repetitions, the UE is expected to be configured with at least one *pucch-FrequencyHoppingInterval-r17* and *pucch-TimeDomainWindowLength-r17*. When DMRS bundling for PUCCH is enabled by *pucch-DMRS-Bundling-r17*, PUCCH frequency hopping interval is only determined by the configuration of PUCCH hopping interval if PUCCH hopping interval is configured. If the field is absent, the number of consecutive slots for the UE to perform inter-slot PUCCH frequency hopping is indicated by *pucch-TimeDomainWindowLength-r17*.

pucch-TimeDomainWindowLength

Configures the length of a nominal time domain window in slots for DMRS bundling for PUCCH. The value shall not exceed the maximum duration for DMRS bundling for PUCCH as specified in TS 38.306 [26]. If this field is absent, the UE shall apply the default value that is the minimum value in the unit of consecutive slots of the time duration for the transmission of all PUCCH repetitions and the maximum duration for DMRS bundling for PUCCH as specified in TS 38.306 [26].

pucch-WindowRestart

Indicates whether UE bundles PUCCH DMRS remaining in a nominal time domain window after event(s) triggered by DCI or MAC CE that violate power consistency and phase continuity requirements is enabled (see TS 38.214 [19], clause 6.1.7).

NOTE: Events, which are triggered by DCI or MAC CE, but do not require UE capability to resume maintaining power consistency and/or phase continuity as specified in clause 6.1.7 of TS 38.214 [19], are excluded.

DMRS-BundlingPUSCH-Config

The IE *DMRS-BundlingPUSCH-Config-r17* is used to configure DMRS bundling for PUSCH.

DMRS-BundlingPUSCH-Config information element

```
-- ASN1START
-- TAG-DMRS-BUNDLINGPUSCH-CONFIG-START
DMRS-BundlingPUSCH-Config-r17 ::=
                                          SEOUENCE {
    pusch-DMRS-Bundling-r17
                                              ENUMERATED {enabled}
                                                                                                              OPTIONAL, -- Need R
    pusch-TimeDomainWindowLength-r17
                                              INTEGER (2..32)
                                                                                                              OPTIONAL, -- Need S
   pusch-WindowRestart-r17
                                              ENUMERATED {enabled}
                                                                                                              OPTIONAL, -- Need R
   pusch-FrequencyHoppingInterval-r17
                                              ENUMERATED {s2, s4, s5, s6, s8, s10, s12, s14, s16, s20}
                                                                                                              OPTIONAL, -- Need S
-- TAG-DMRS-BUNDLINGPUSCH-CONFIG-STOP
-- ASN1STOP
```

DMRS-BundlingPUSCH-Config field descriptions

pusch-DMRS-Bundling

Indicates whether DMRS bundling and time domain window for PUSCH are jointly enabled.

pusch-FrequencyHoppingInterval

Configures the number of consecutive slots for the UE to perform inter-slot frequency hopping with inter-slot bundling for PUSCH. When both inter-frequency hopping and DMRS bundling are enabled for PUSCH repetitions, the UE is expected to be configured with at least one *pusch-FrequencyHoppingInterval-r17* and *pusch-TimeDomainWindowLength-r17*. This parameter is shared for both DG-PUSCH and CG-PUSCH. When DMRS bundling for PUSCH is enabled by *pusch-DMRS-Bundling-r17*, PUSCH frequency hopping interval is only determined by the configuration of PUSCH hopping interval if PUSCH hopping interval is configured. If the field is absent, the number of consecutive slots for the UE to perform inter-slot PUSCH frequency hopping is indicated by *pusch-TimeDomainWindowLength-r17*.

Note: For unpaired spectrum, the UE is not expected to be configured the value of s6, s8, s12, s14 and s16.

pusch-TimeDomainWindowLength

Configures the length of a nominal time domain window in number of consecutive slots for DMRS bundling for PUSCH. The value shall not exceed the maximum duration for DMRS bundling for PUSCH as specified in TS 38.306 [26]. For PUSCH repetition type A/B, if this field is absent, the UE shall apply the default value that is the minimum value in the unit of consecutive slots of the time duration for the transmission of all PUSCH repetitions and the maximum duration for DMRS bundling for PUSCH as specified in TS 38.306 [26]. For TBoMS, if this field is absent, the UE shall apply the default value that is the minimum value in the unit of consecutive slots of the duration of TBoMS transmission (including repetition of TBoMS) and the maximum duration for DMRS bundling for PUSCH as specified in TS 38.306 [26].

pusch-WindowRestart

Indicates whether UE bundles PUSCH DMRS remaining in a nominal time domain window after event(s) triggered by DCI or MAC CE that violate power consistency and phase continuity requirements is enabled (see TS 38.214 [19], clause 6.1.7).

NOTE: Events, which are triggered by DCI or MAC CE, but do not require UE capability to resume maintaining power consistency and/or phase continuity as specified in clause 6.1.7 of TS 38.214 [19], are excluded.

DMRS-DownlinkConfig

The IE DMRS-DownlinkConfig is used to configure downlink demodulation reference signals for PDSCH.

DMRS-DownlinkConfig information element

```
-- ASN1START
-- TAG-DMRS-DOWNLINKCONFIG-START
DMRS-DownlinkConfig ::=
                                  SEOUENCE {
   dmrs-Type
                                      ENUMERATED {type2}
                                                                                                            OPTIONAL, -- Need S
   dmrs-AdditionalPosition maxLength
                                                                                                            OPTIONAL, -- Need S
                                      ENUMERATED {pos0, pos1, pos3}
                                      ENUMERATED {len2}
                                                                                                            OPTIONAL, -- Need S
   scramblingID0
                                      INTEGER (0..65535)
                                                                                                            OPTIONAL, -- Need S
                                                                                                                       -- Need S
   scramblingID1
                                      INTEGER (0..65535)
                                                                                                            OPTIONAL,
                                      SetupRelease { PTRS-DownlinkConfig }
   phaseTrackingRS
                                                                                                            OPTIONAL,
                                                                                                                       -- Need M
                                  ENUMERATED {enabled}
   dmrs-Downlink-r16
                                                                                                            OPTIONAL
                                                                                                                       -- Need R
    ]]
-- TAG-DMRS-DOWNLINKCONFIG-STOP
-- ASN1STOP
```

DMRS-DownlinkConfig field descriptions

dmrs-AdditionalPosition

Position for additional DM-RS in DL, see Tables 7.4.1.1.2-3 and 7.4.1.1.2-4 in TS 38.211 [16]. If the field is absent, the UE applies the value pos2. See also clause 7.4.1.1.2 for additional constraints on how the network may set this field depending on the setting of other fields.

dmrs-Downlink

This field indicates whether low PAPR DMRS is used, as specified in TS38.211 [16], clause 7.4.1.1.1.

dmrs-Type

Selection of the DMRS type to be used for DL (see TS 38.211 [16], clause 7.4.1.1.1). If the field is absent, the UE uses DMRS type 1.

maxLength

The maximum number of OFDM symbols for DL front loaded DMRS. *len1* corresponds to value 1. *len2* corresponds to value 2. If the field is absent, the UE applies value *len1*. If set to *len2*, the UE determines the actual number of DM-RS symbols by the associated DCI, (see TS 38,211 [16], clause 7.4.1.1.2).

phaseTrackingRS

Configures downlink PTRS. If the field is not configured, the UE assumes that downlink PTRS are absent. See TS 38.214 [19] clause 5.1.6.3.

scramblingID0

DL DMRS scrambling initialization (see TS 38.211 [16], clause 7.4.1.1.1). When the field is absent the UE applies the value physCellId configured for this serving cell.

scramblingID1

DL DMRS scrambling initialization (see TS 38.211 [16], clause 7.4.1.1.1). When the field is absent the UE applies the value physCellId configured for this serving cell.

DMRS-UplinkConfig

The IE DMRS-UplinkConfig is used to configure uplink demodulation reference signals for PUSCH.

DMRS-UplinkConfig information element

```
-- ASN1START
-- TAG-DMRS-UPLINKCONFIG-START
DMRS-UplinkConfig ::=
                                   SEOUENCE {
    dmrs-Type
                                       ENUMERATED {type2}
                                                                                                          OPTIONAL, -- Need S
                                       ENUMERATED {pos0, pos1, pos3}
    dmrs-AdditionalPosition
                                                                                                          OPTIONAL,
                                                                                                                     -- Need S
                                       SetupRelease { PTRS-UplinkConfig }
    phaseTrackingRS
                                                                                                          OPTIONAL,
                                                                                                                     -- Need M
                                       ENUMERATED {len2}
                                                                                                          OPTIONAL,
    maxLength
                                                                                                                     -- Need S
                                       SEOUENCE {
    transformPrecodingDisabled
       scramblingID0
                                           INTEGER (0..65535)
                                                                                                          OPTIONAL,
                                                                                                                     -- Need S
       scramblingID1
                                           INTEGER (0..65535)
                                                                                                          OPTIONAL,
                                                                                                                     -- Need S
        . . . ,
        ] ]
                                           ENUMERATED {enabled}
       dmrs-Uplink-r16
                                                                                                          OPTIONAL
                                                                                                                      -- Need R
       11
                                                                                                          OPTIONAL,
                                                                                                                     -- Need R
    transformPrecodingEnabled
                                       SEQUENCE {
                                           INTEGER(0..1007)
       nPUSCH-Identity
                                                                                                          OPTIONAL,
                                                                                                                     -- Need S
                                           ENUMERATED {disabled}
       sequenceGroupHopping
                                                                                                          OPTIONAL, -- Need S
       sequenceHopping
                                           ENUMERATED {enabled}
                                                                                                          OPTIONAL, -- Need S
        ] ]
```

-- ASN1STOP

DMRS-UplinkConfig field descriptions

dmrs-AdditionalPosition

Position for additional DM-RS in UL (see TS 38.211 [16], clause 6.4.1.1.3). If the field is absent, the UE applies the value pos2. See also clause 6.4.1.1.3 for additional constraints on how the network may set this field depending on the setting of other fields.

dmrs-Type

Selection of the DMRS type to be used for UL (see TS 38.211 [16], clause 6.4.1.1.3) If the field is absent, the UE uses DMRS type 1.

dmrs-Uplink

This field indicates whether low PAPR DMRS is used, as specified in TS38.211 [16], clause 6.4.1.1.1.1.

dmrs-UplinkTransformPrecoding

This field indicates whether low PAPR DMRS is used for PUSCH with pi/2 BPSK modulation, as specified in TS38.211 [16], clause 6.4.1.1.1.2. The network configures this field only if *tp-pi2BPSK* is configured in *PUSCH-Config*.

maxLength

The maximum number of OFDM symbols for UL front loaded DMRS. *len1* corresponds to value 1. *len2* corresponds to value 2. If the field is absent, the UE applies value *len1*. If set to *len2*, the UE determines the actual number of DM-RS symbols by the associated DCI. (see TS 38.211 [16], clause 6.4.1.1.3).

nPUSCH-Identity

Parameter: N_ID^(PUSCH) for DFT-s-OFDM DMRS. If the value is absent or released, the UE uses the value Physical cell ID (physCellId). See TS 38.211 [16].

phaseTrackingRS

Configures uplink PTRS (see TS 38.211 [16]).

pi2BPSK-ScramblingID0, pi2BPSK-ScramblingID1

UL DMRS scrambling initialization for pi/2 BPSK DMRS for PUSCH (see TS 38.211 [16], Clause 6.4.1.1.2). When the field is absent the UE applies the value Physical cell ID (physCellId) of the serving cell.

scramblingID0

UL DMRS scrambling initialization for CP-OFDM (see TS 38.211 [16], clause 6.4.1.1.1.1). When the field is absent the UE applies the value Physical cell ID (physCellId).

scramblingID1

UL DMRS scrambling initialization for CP-OFDM. (see TS 38.211 [16], clause 6.4.1.1.1.1). When the field is absent the UE applies the value Physical cell ID (physCellId).

sequenceGroupHopping

For DMRS transmission with transform precoder the NW may configure group hopping by the cell-specific parameter *groupHoppingEnabledTransformPrecoding* in *PUSCH-ConfigCommon*. In this case, the NW may include this UE specific field to disable group hopping for PUSCH transmission except for Msg3, i.e., to override the configuration in *PUSCH-ConfigCommon* (see TS 38.211 [16]). If the field is absent, the UE uses the same hopping mode as for Msg3.

sequenceHopping

Determines if sequence hopping is enabled for DMRS transmission with transform precoder for PUSCH transmission other than Msg3 (sequence hopping is always disabled for Msg3). If the field is absent, the UE uses the same hopping mode as for msg3. The network does not configure simultaneous group hopping and sequence hopping. See TS 38.211 [16], clause 6.4.1.1.1.2.

transformPrecodingDisabled

DMRS related parameters for Cyclic Prefix OFDM.

transform Precoding Enabled

DMRS related parameters for DFT-s-OFDM (Transform Precoding).

DownlinkConfigCommon

The IE *DownlinkConfigCommon* provides common downlink parameters of a cell.

DownlinkConfigCommon information element

OPTIONAL, -- Cond InterFreqHOAndServCellAdd

OPTIONAL. -- Cond ServCellAdd

OPTIONAL -- Need R

```
-- TAG-DOWNLINKCONFIGCOMMON-START

DownlinkConfigCommon ::= SEQUENCE {
    frequencyInfoDL FrequencyInfoDL
    initialDownlinkBWP BWP-DownlinkCommon
    ...,
    [[
    initialDownlinkBWP-RedCap-r17 BWP-DownlinkCommon

]]
}

-- TAG-DOWNLINKCONFIGCOMMON-STOP
-- ASN1STOP
```

DownlinkConfigCommon field descriptions

frequencyInfoDL

Basic parameters of a downlink carrier and transmission thereon.

initialDownlinkBWP

The initial downlink BWP configuration for a serving cell. The network configures the *locationAndBandwidth* so that the initial downlink BWP contains the entire CORESET#0 of this serving cell in the frequency domain.

initialDownlinkBWP-RedCap

If present, RedCap UEs use this DL BWP instead of initialDownlinkBWP.

If absent, RedCap UEs use initialDownlinkBWP provided that it does not exceed the RedCap UE maximum bandwidth (see also clause 5.2.2.4.2).

Conditional Presence	Explanation
InterFreqHOAndServCellAdd	This field is mandatory present for inter-frequency handover, and upon serving cell (PSCell/SCell) addition. Otherwise, the field is
	optionally present, Need M.
ServCellAdd	This field is mandatory present upon serving cell addition (for PSCell and SCell) and upon handover from E-UTRA to NR. It is
	optionally present, Need M otherwise.

DownlinkConfigCommonSIB

The IE *DownlinkConfigCommonSIB* provides common downlink parameters of a cell.

DownlinkConfigCommonSIB information element

```
-- ASN1START
-- TAG-DOWNLINKCONFIGCOMMONSIB-START

DownlinkConfigCommonSIB ::= SEQUENCE {
    frequencyInfoDL FrequencyInfoDL-SIB,
    initialDownlinkBWP BWP-DownlinkCommon,
    bcch-Config BCCH-Config,
    pcch-Config PCCH-Config,
```

```
pei-Config-r17
                                     PEI-Config-r17
                                                                             OPTIONAL.
                                                                                           -- Need R
    initialDownlinkBWP-RedCap-r17
                                    BWP-DownlinkCommon
                                                                             OPTIONAL
                                                                                            -- Need R
    11
BCCH-Config ::=
                                 SEOUENCE {
    modificationPeriodCoeff
                                     ENUMERATED {n2, n4, n8, n16},
PCCH-Config ::=
                             SEOUENCE {
    defaultPagingCycle
                                         PagingCycle,
    nAndPagingFrameOffset
                                         CHOICE {
        oneT
                                             NULL,
        halfT
                                             INTEGER (0..1),
        quarterT
                                             INTEGER (0..3),
        oneEighthT
                                             INTEGER (0..7),
        oneSixteenthT
                                             INTEGER (0..15)
                                         ENUMERATED {four, two, one},
    ns
    firstPDCCH-MonitoringOccasionOfPO
                                         CHOICE {
        sCS15KHZoneT
                                                                                       SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..139),
        sCS30KHZoneT-SCS15KHZhalfT
                                                                                       SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..279),
                                                                                       SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..559),
        sCS60KHZoneT-SCS30KHZhalfT-SCS15KHZquarterT
        {\tt sCS120KHZ} one {\tt T-SCS60KHZ} half {\tt T-SCS30KHZ} quarter {\tt T-SCS15KHZ} one {\tt EighthT}
                                                                                       SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..1119),
        sCS120KHZhalfT-SCS60KHZquarterT-SCS30KHZoneEiqhthT-SCS15KHZoneSixteenthT
                                                                                       SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..2239),
        sCS480KHZoneT-SCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT
                                                                                       SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..4479),
                                                                                       SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..8959),
        sCS480KHZhalfT-SCS120KHZoneEighthT-SCS60KHZoneSixteenthT
        sCS480KHZquarterT-SCS120KHZoneSixteenthT
                                                                                       SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..17919)
           OPTIONAL,
                               -- Need R
    . . . ,
    11
    nrofPDCCH-MonitoringOccasionPerSSB-InPO-r16
                                                        INTEGER (2..4)
                                                                                      OPTIONAL -- Cond SharedSpectrum2
    ranPagingInIdlePO-r17
                                                        ENUMERATED {true}
                                                                                      OPTIONAL, -- Need R
    firstPDCCH-MonitoringOccasionOfPO-v1710 CHOICE {
       sCS480KHZoneEighthT
                                   SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..35839),
       sCS480KHZoneSixteenthT
                                   SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..71679)
                                                                                     OPTIONAL -- Need R
    11
PEI-Config-r17 ::=
                                           SEOUENCE {
    po-NumPerPEI-r17
                                               ENUMERATED {po1, po2, po4, po8},
    payloadSizeDCI-2-7-r17
                                               INTEGER (1..maxDCI-2-7-Size-r17),
    pei-FrameOffset-r17
                                               INTEGER (0..16),
    subgroupConfig-r17
                                               SubgroupConfig-r17,
    lastUsedCellOnly-r17
                                               ENUMERATED {true}
                                                                                                                   OPTIONAL, -- Need R
    . . .
```

OPTIONAL, -- Need S

DownlinkConfigCommonSIB field descriptions

bcch-Config

The modification period related configuration.

frequencyInfoDL-SIB

Basic parameters of a downlink carrier and transmission thereon.

initialDownlinkBWP

The initial downlink BWP configuration for a PCell. The network configures the *locationAndBandwidth* so that the initial downlink BWP contains the entire CORESET#0 of this serving cell in the frequency domain. The UE applies the *locationAndBandwidth* upon reception of this field (e.g. to determine the frequency position of signals described in relation to this *locationAndBandwidth*) but it keeps CORESET#0 until after reception of *RRCSetup/RRCResume/RRCReestablishment*.

initialDownlinkBWP-RedCap

If present, RedCap UEs use this DL BWP instead of *initialDownlinkBWP*. If the *locationAndBandwidth* of this BWP contains the entire CORESET#0, the UE applies the *locationAndBandwidth* upon reception of this field (e.g. to determine the frequency position of signals described in relation to this *locationAndBandwidth*) but it keeps CORESET#0 until after reception of *RRCSetup/RRCResume/RRCReestablishment*. Otherwise, i.e., if the *locationAndBandwidth* of this BWP does not contain the entire CORESET#0, the UE uses this BWP for receiving DL messages during initial access (Msg2, Msg4) and after initial access.

If absent, RedCap UEs use initialDownlinkBWP provided that it does not exceed the RedCap UE maximum bandwidth (see also clause 5.2.2.4.2).

lastUsedCellOnly

When present, the field indicates that the UE monitors PEI only if the latest received RRCRelease without noLastCellUpdate is from this cell. A PEI-capable UE stores its last used cell information.

nrofPDCCH-MonitoringOccasionPerSSB-InPO

The number of PDCCH monitoring occasions corresponding to an SSB within a Paging Occasion, see TS 38.304 [20], clause 7.1.

pcch-Config

The paging related configuration.

pei-Confia

The PEI related configuration.

subgroupConfig

The paging subgroup related configuration.

BCCH-Config field descriptions

modificationPeriodCoeff

Actual modification period, expressed in number of radio frames m = modificationPeriodCoeff * defaultPagingCycle, see clause 5.2.2.2.2. n2 corresponds to value 2, n4 corresponds to value 4, and so on.

PCCH-Config field descriptions

defaultPagingCycle

Default paging cycle, used to derive 'T' in TS 38.304 [20]. Value rf32 corresponds to 32 radio frames, value rf64 corresponds to 64 radio frames and so on.

firstPDCCH-MonitoringOccasionOfPO

Points out the first PDCCH monitoring occasion for paging of each PO of the PF, see TS 38.304 [20].

nAndPagingFrameOffset

Used to derive the number of total paging frames in T (corresponding to parameter N in TS 38.304 [20]) and paging frame offset (corresponding to parameter PF_offset in TS 38.304 [20]). A value of oneSixteenthT corresponds to T / 16, a value of oneEighthT corresponds to T / 8, and so on.

If pagingSearchSpace is set to zero and if SS/PBCH block and CORESET multiplexing pattern is 2 or 3 (as specified in TS 38.213 [13]):

- for ssb-periodicityServingCell of 5 or 10 ms, N can be set to one of {oneT, halfT, quarterT, oneEighthT, oneSixteenthT}
- for ssb-periodicityServingCell of 20 ms, N can be set to one of {halfT, quarterT, oneEighthT, oneSixteenthT}
- for ssb-periodicityServingCell of 40 ms, N can be set to one of {quarterT, oneEighthT, oneSixteenthT}
- for ssb-periodicityServingCell of 80 ms, N can be set to one of {oneEighthT, oneSixteenthT}
- for ssb-periodicityServingCell of 160 ms, N can be set to oneSixteenthT

If pagingSearchSpace is set to zero and if SS/PBCH block and CORESET multiplexing pattern is 1 (as specified in TS 38.213 [13]), N can be set to one of {halfT, quarterT, oneEighthT, oneSixteenthT}

If pagingSearchSpace is not set to zero, N can be configured to one of {oneT, halfT, quarterT, oneEighthT, oneSixteenthT}

ns

Number of paging occasions per paging frame.

ranPagingInIdlePO

Indicates that the network supports to send RAN paging in PO that corresponds to the i_s as determined by UE in RRC_IDLE state, see TS38.304 [20].

PEI-Config field descriptions

payloadSizeDCI-2-7

Payload size of PEI DCI, i.e., DCI format 2_7. The size is no larger than the payload size of paging DCI which has maximum of 41 bits and 43 bits for licensed and unlicensed spectrums, respectively.

pei-FrameOffset

Offset, in number of frames from the start of a reference frame for PEI-O to the start of a first paging frame of the paging frames associated with the PEI-O, see TS 38.213 [13], clause 10.4A.

po-NumPerPEI

The number of PO(s) associated with one PEI monitoring occasion. It is a factor of the total PO number in a paging cycle, i.e N x Ns, as specified in TS 38.304 [20]. The maximum number of PF associated with one PEI monitoring occasion is 2. The number of PO mapping to one PEI should be multiple of Ns when *po-NumPerPEI* is larger than Ns.

SubgroupConfig field descriptions

subgroupsNumPerPO

Total number of subgroups per Paging Occasion (PO) for UE to read subgroups indication from physical-layer signaling. The field represents the sum of CN-assigned and UEID-based subgroups supported by the network. When *PEI-Config* is configured, there is always at least one subgroup (UEID-based subgroup or CN-assigned subgroup) configured.

subgroupsNumForUEID

Number of subgroups per Paging Occasion (PO) for UE to read subgroups indication from physical-layer signaling, for UEID-based subgrouping method. When present, the field is set to an integer smaller than or equal to *subgroupsNumPerPO*. *subgroupsNumPerPO* equals to *subgroupsNumForUEID* when the network does not support CN-assigned subgrouping. The field is absent when the network only supports CN-assigned subgrouping. Both this field and *subgroupsNumPerPO* are equal to 1 when the network does not support subgrouping.

Conditional Presence	Explanation
SharedSpectrum2	The field is optional present, Need R, if this cell operates with shared spectrum channel access. Otherwise, it is absent,
	Need R.

DownlinkPreemption

The IE *DownlinkPreemption* is used to configure the UE to monitor PDCCH for the INT-RNTI (interruption).

DownlinkPreemption information element

```
-- ASN1START
-- TAG-DOWNLINKPREEMPTION-START
DownlinkPreemption ::=
                                  SEOUENCE {
   int-RNTI
                                      RNTI-Value,
   int-RNII
timeFrequencySet
                                      ENUMERATED {set0, set1},
                                      INTEGER (0..maxINT-DCI-PayloadSize),
   int-ConfigurationPerServingCell SEOUENCE (SIZE (1..maxNrofServingCells)) OF INT-ConfigurationPerServingCell,
INT-ConfigurationPerServingCell ::= SEQUENCE {
    servingCellId
   positionInDCI
                                      INTEGER (0..maxINT-DCI-PayloadSize-1)
-- TAG-DOWNLINKPREEMPTION-STOP
-- ASN1STOP
```

DownlinkPreemption field descriptions

dci-PayloadSize

Total length of the DCI payload scrambled with INT-RNTI (see TS 38.213 [13], clause 11.2).

int-ConfigurationPerServingCell

Indicates (per serving cell) the position of the 14 bit INT values inside the DCI payload (see TS 38.213 [13], clause 11.2).

int-RNTI

RNTI used for indication pre-emption in DL (see TS 38.213 [13], clause 10).

timeFrequencySet

Set selection for DL-preemption indication (see TS 38.213 [13], clause 11.2) The set determines how the UE interprets the DL preemption DCI payload.

INT-ConfigurationPerServingCell field descriptions

positionInDCI

Starting position (in number of bit) of the 14 bit INT value applicable for this serving cell (servingCellId) within the DCI payload (see TS 38.213 [13], clause 11.2). Must be multiples of 14 (bit).

DRB-Identity

The IE *DRB-Identity* is used to identify a DRB used by a UE.

DRB-Identity information element

```
-- ASN1START
-- TAG-DRB-IDENTITY-START

DRB-Identity ::= INTEGER (1..32)
-- TAG-DRB-IDENTITY-STOP
-- ASN1STOP
```

- DRX-Config

The IE *DRX-Config* is used to configure DRX related parameters.

DRX-Config information element

```
-- ASN1START
-- TAG-DRX-CONFIG-START
DRX-Config ::=
                                    SEOUENCE {
    drx-onDurationTimer
                                        CHOICE {
                                            subMilliSeconds INTEGER (1..31),
                                            milliSeconds ENUMERATED {
                                                ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60,
                                                ms80, ms100, ms200, ms300, ms400, ms500, ms600, ms800, ms1000, ms1200,
                                                ms1600, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1 }
                                            },
    drx-InactivityTimer
                                        ENUMERATED {
                                            ms0, ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60, ms80,
                                            ms100, ms200, ms300, ms500, ms750, ms1280, ms1920, ms2560, spare9, spare8,
                                            spare7, spare6, spare5, spare4, spare3, spare2, spare1},
    drx-HARO-RTT-TimerDL
                                        INTEGER (0..56),
    drx-HARO-RTT-TimerUL
                                        INTEGER (0..56),
    drx-RetransmissionTimerDL
                                        ENUMERATED {
                                            sl0, sl1, sl2, sl4, sl6, sl8, sl16, sl24, sl33, sl40, sl64, sl80, sl96, sl112, sl128,
                                            sl160, sl320, spare15, spare14, spare13, spare12, spare11, spare10, spare9,
                                            spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1},
    drx-RetransmissionTimerUL
                                        ENUMERATED {
                                            sl0, sl1, sl2, sl4, sl6, sl8, sl16, sl24, sl33, sl40, sl64, sl80, sl96, sl112, sl128,
                                            s1160, s1320, spare15, spare14, spare13, spare12, spare11, spare10, spare9,
                                            spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1 },
    drx-LongCycleStartOffset
                                        CHOICE {
       ms10
                                            INTEGER(0..9),
        ms20
                                            INTEGER(0..19),
        ms32
                                            INTEGER(0..31),
        ms40
                                            INTEGER(0..39),
```

```
ms60
                                            INTEGER(0..59),
        ms64
                                            INTEGER(0..63),
        ms70
                                            INTEGER(0..69),
        ms80
                                            INTEGER(0..79),
        ms128
                                            INTEGER(0..127),
        ms160
                                            INTEGER(0..159),
        ms256
                                            INTEGER(0..255),
        ms320
                                            INTEGER(0..319),
        ms512
                                            INTEGER(0..511),
        ms640
                                            INTEGER(0..639),
        ms1024
                                            INTEGER(0..1023),
        ms1280
                                            INTEGER(0..1279),
        ms2048
                                            INTEGER(0..2047),
        ms2560
                                            INTEGER(0..2559),
       ms5120
                                            INTEGER(0..5119),
        ms10240
                                            INTEGER(0..10239)
    shortDRX
                                        SEOUENCE {
        drx-ShortCycle
                                            ENUMERATED {
                                                ms2, ms3, ms4, ms5, ms6, ms7, ms8, ms10, ms14, ms16, ms20, ms30, ms32,
                                                ms35, ms40, ms64, ms80, ms128, ms160, ms256, ms320, ms512, ms640, spare9,
                                                spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1 },
        drx-ShortCycleTimer
                                            INTEGER (1..16)
                                                                                                                 OPTIONAL,
                                                                                                                            -- Need R
    drx-SlotOffset
                                        INTEGER (0..31)
DRX-ConfigExt-v1700 ::=
                                        SEQUENCE {
    drx-HARO-RTT-TimerDL-r17
                                            INTEGER (0..448),
    drx-HARQ-RTT-TimerUL-r17
                                            INTEGER (0..448)
-- TAG-DRX-CONFIG-STOP
-- ASN1STOP
```

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DRX-Config field descriptions

drx-HARQ-RTT-TimerDL

Value in number of symbols of the BWP where the transport block was received. drx-HARQ-RTT-TimerDL-r17 is only applicable for SCS 480 kHz and 960 kHz. If configured, the UE shall ignore drx-HARQ-RTT-TimerDL (without suffix) for SCS 480 kHz and 960 kHz.

drx-HARQ-RTT-TimerUL

Value in number of symbols of the BWP where the transport block was transmitted. *drx-HARQ-RTT-TimerUL-r17* is only applicable for SCS 480 kHz and 960 kHz. If configured, the UE shall ignore *drx-HARQ-RTT-TimerUL* (without suffix) for SCS 480 kHz and 960 kHz.

drx-InactivityTimer

Value in multiple integers of 1 ms. ms0 corresponds to 0, ms1 corresponds to 1 ms, ms2 corresponds to 2 ms, and so on.

drx-LongCycleStartOffset

drx-LongCycle in ms and drx-StartOffset in multiples of 1 ms. If drx-ShortCycle is configured, the value of drx-LongCycle shall be a multiple of the drx-ShortCycle value.

drx-onDurationTimer

Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSecond). For the latter, value ms1 corresponds to 1 ms, value ms2 corresponds to 2 ms, and so on.

drx-RetransmissionTimerDL

Value in number of slot lengths of the BWP where the transport block was received. value sl0 corresponds to 0 slots, sl1 corresponds to 1 slot, sl2 corresponds to 2 slots, and so on.

drx-RetransmissionTimerUL

Value in number of slot lengths of the BWP where the transport block was transmitted. sl0 corresponds to 0 slots, sl1 corresponds to 1 slot, sl2 corresponds to 2 slots, and so on.

drx-ShortCycleTimer

Value in multiples of drx-ShortCycle. A value of 1 corresponds to drx-ShortCycle, a value of 2 corresponds to 2 * drx-ShortCycle and so on.

drx-ShortCycle

Value in ms. ms1 corresponds to 1 ms, ms2 corresponds to 2 ms, and so on.

drx-SlotOffset

Value in 1/32 ms. Value 0 corresponds to 0 ms, value 1 corresponds to 1/32 ms, value 2 corresponds to 2/32 ms, and so on.

DRX-ConfigSecondaryGroup

The IE DRX-ConfigSecondaryGroup is used to configure DRX related parameters for the second DRX group as specified in TS 38.321 [3].

DRX-ConfigSecondaryGroup information element

```
}
-- TAG-DRX-CONFIGSECONDARYGROUP-STOP
-- ASN1STOP
```

DRX-ConfigSecondaryGroup field descriptions

drx-InactivityTimer

Value in multiple integers of 1 ms. ms0 corresponds to 0 ms, ms1 corresponds to 1 ms, ms2 corresponds to 2 ms, and so on, as specified in TS 38.321 [3]. The network configures a drx-InactivityTimer value for the second DRX group that is smaller than the drx-InactivityTimer configured for the default DRX group in IE DRX-Config.

drx-onDurationTimer

Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSeconds). For the latter, value *ms1* corresponds to 1 ms, value *ms2* corresponds to 2 ms, and so on, as specified in TS 38.321 [3]. The network configures a *drx-onDurationTimer* value for the second DRX group that is smaller than the *drx-onDurationTimer* configured for the default DRX group in IE *DRX-Config*.

DRX-ConfigSL

The IE DRX-ConfigSL is used to configure additional DRX parameters for the UE performing sidelink operation with resource allocation mode 1, as specified in TS 38.321 [3].

DRX-ConfigSL information element

DRX-ConfigSL field descriptions

drx-HARQ-RTT-TimerSL

Value in number of symbols of the BWP where the PDCCH was transmitted. Value 0 is used in case sl-PUCCH-Config is not configured and the corresponding resource pool is not configured with PSFCH.

drx-RetransmissionTimerSL

Value in number of slot lengths of the BWP where the PDCCH was transmitted. sl0 corresponds to 0 slots, sl1 corresponds to 1 slot, sl2 corresponds to 2 slots, and so on.

- EphemerisInfo

The IE *EphemerisInfo* provides satellite ephemeris. Ephemeris may be expressed either in format of position and velocity state vector in ECEF or in format of orbital parameters in ECI. Note: The ECI and ECEF coincide at *epochTime*, i.e., x,y,z axis in ECEF are aligned with x,y,z axis in ECI at *epochTime*.

EphemerisInfo information element

```
-- ASN1START
-- TAG-EPHEMERISINFO-START
EphemerisInfo-r17 ::=
                                     CHOICE {
    positionVelocity-r17
                                          PositionVelocity-r17,
     orbital-r17
                                          Orbital-r17
PositionVelocity-r17 ::=
                                    SEOUENCE {
     positionX-r17
                                         PositionStateVector-r17,
    positionY-r17
                                    PositionStateVector-r17,
PositionStateVector-r17,
VelocityStateVector-r17,
VelocityStateVector-r17,
                                         PositionStateVector-r17,
    positionZ-r17
    velocityVX-r17
    velocityVY-r17
                                         VelocityStateVector-r17,
     velocityVZ-r17
                                          VelocityStateVector-r17
Orbital-r17 ::=
                                    SEQUENCE {
     semiMajorAxis-r17
                                         INTEGER (0..8589934591),
                                   INTEGER (0...1048575),

INTEGER (0...268435455),

INTEGER (0...268435455),

INTEGER (-67108864...671(

INTEGER (0...268435455)
     eccentricity-r17
    periapsis-r17
     longitude-r17
     inclination-r17
                                         INTEGER (-67108864..67108863),
     meanAnomaly-r17
                                         INTEGER (0..268435455)
PositionStateVector-r17 ::= INTEGER (-33554432...33554431)
VelocityStateVector-r17 ::= INTEGER (-131072..131071)
-- TAG-EPHEMERISINFO-STOP
-- ASN1STOP
```

EphemerisInfo field descriptions

Satellite orbital parameter: eccentricity e, see NIMA TR 8350.2 [71]. Unit is radian.

Step of 1.431 * 10^{-8} . Actual value = field value * $(1.431 * 10^{-8})$.

inclination

eccentricity

Satellite orbital parameter: inclination i, see NIMA TR 8350.2 [71]. Unit is radian.

Step of $2.341^* \cdot 10^{-8}$ rad. Actual value = field value * $(2.341^* \cdot 10^{-8})$.

longitude

Satellite orbital parameter: longitude of ascending node Ω , see NIMA TR 8350.2 [71]. Unit is radian.

Step of 2.341* 10^{-8} rad. Actual value = field value * (2.341* 10^{-8}).

meanAnomaly

Satellite orbital parameter: Mean anomaly M at epoch time, see NIMA TR 8350.2 [71]. Unit is radian.

Step of 2.341* 10⁻⁸ rad. Actual value = field value * (2.341* 10⁻⁸).

periapsis

Satellite orbital parameter: argument of periapsis ω, see NIMA TR 8350.2 [71]. Unit is radian.

Step of 2.341* 10⁻⁸ rad. Actual value = field value * (2.341* 10⁻⁸).

positionX, positionY, positionZ

X, Y, Z coordinate of satellite position state vector in ECEF. Unit is meter.

Step of 1.3 m. Actual value = field value * 1.3.

semiMajorAxis

Satellite orbital parameter: semi major axis α , see NIMA TR 8350.2 [71]. Unit is meter.

Step of 4.249 * 10^{-3} m. Actual value = $6500000 + \text{field value} * (4.249 * <math>10^{-3}$).

velocityVX, velocityVY, velocityVZ

X, Y, Z coordinate of satellite velocity state vector in ECEF. Unit is meter/second.

Step of 0.06 m/s. Actual value = field value * 0.06.

FeatureCombination

The IE *FeatureCombination* indicates a feature or a combination of features to be associated with a set of Random Access resources (i.e. an instance of *FeatureCombinationPreambles*).

FeatureCombination information element

```
-- ASN1START
-- TAG-FEATURECOMBINATION-START
FeatureCombination-r17 ::= SEQUENCE {
                                                                              OPTIONAL, -- Need R
   redCap-r17
                           ENUMERATED {true}
   smallData-r17
                            ENUMERATED {true}
                                                                              OPTIONAL, -- Need R
                            NSAG-List-r17
                                                                              OPTIONAL, -- Need R
   msg3-Repetitions-r17
                                                                              OPTIONAL, -- Need R
                            ENUMERATED {true}
   spare4
                            ENUMERATED {true
                                                                              OPTIONAL, -- Need R
                                                                              OPTIONAL, -- Need R
   spare3
                            ENUMERATED {true}
   spare2
                            ENUMERATED {true}
                                                                              OPTIONAL, -- Need R
                                                                              OPTIONAL -- Need R
   spare1
                            ENUMERATED {true}
```

```
NSAG-List-r17 ::= SEQUENCE (SIZE (1.. maxSliceInfo-r17)) OF NSAG-ID-r17
-- TAG-FEATURECOMBINATION-STOP
-- ASN1STOP
```

FeatureCombination field descriptions

redCap

If present, this field indicates that RedCap is part of this feature combination.

smallData

If present, this field indicates that Small Data is part of this feature combination.

nsag

If present, this field indicates NSAG(s) that are part of this feature combination.

msg3-Repetitions

If present, this field indicates that signalling of msg3 repetition is part of this feature combination. This field is not configured in a set of preambles that is configured with 2-step random-access type.

FeatureCombinationPreambles

The IE *FeatureCombinationPreambles* associates a set of preambles with a feature combination. For parameters which can be provided in this IE, the UE applies this field value when performing Random Access using a preamble in this featureCombinationPreambles, otherwise the UE applies the corresponding value as determined by applicable Need Code, e.g. Need S. On a specific BWP, there can be at most one set of preambles associated with a given feature combination per RA Type (i.e. 4-step RACH).

FeatureCombinationPreambles information element

```
-- ASN1START
-- TAG-FEATURECOMBINATIONPREAMBLES-START
FeatureCombinationPreambles-r17 ::= SEOUENCE {
    featureCombination-r17
                                         FeatureCombination-r17,
    startPreambleForThisPartition-r17
                                         INTEGER (0..63),
    numberOfPreamblesPerSSB-ForThisPartition-r17 INTEGER (1..64),
                                         INTEGER (1..15)
    ssb-SharedRO-MaskIndex-r17
                                                                                                   OPTIONAL, -- Need S
    groupBconfigured-r17
                                         SEOUENCE {
       ra-SizeGroupA-r17
                                             ENUMERATED {b56, b144, b208, b256, b282, b480, b640,
                                                       b800, b1000, b72, spare6, spare5, spare4, spare3, spare2, spare1},
                                             ENUMERATED { minusinfinity, dB0, dB5, dB8, dB10, dB12, dB15, dB18},
       messagePowerOffsetGroupB-r17
       numberOfRA-PreamblesGroupA-r17
                                             INTEGER (1..64)
                                                                                                   OPTIONAL, -- Need R
    separateMsgA-PUSCH-Config-r17
                                         MsgA-PUSCH-Config-r16
                                                                                                   OPTIONAL, -- Cond MsgAConfigCommon
    msqA-RSRP-Threshold-r17
                                         RSRP-Range
                                                                                                   OPTIONAL, -- Need R
    rsrp-ThresholdSSB-r17
                                                                                                   OPTIONAL, -- Need R
                                         RSRP-Range
    deltaPreamble-r17
                                         INTEGER (-1..6)
                                                                                                   OPTIONAL, -- Need R
-- TAG-FEATURECOMBINATIONPREAMBLES-STOP
```

-- ASN1STOP

FeatureCombinationPreambles field descriptions

deltaPreamble

Power offset between msg3 or msgA-PUSCH and RACH preamble transmission. If configured, this parameter overrides msg3-DeltaPreamble or msgA-DeltaPreamble, Actual value = field value * 2 [dB] (see TS 38.213 [13], clause 7.1). If msgA-DeltaPreamble is configured in separateMsgA-PUSCH-Config-r17, this field is absent.

featureCombination

Indicates which combination of features that the preambles indicated by this IE are associated with. The UE ignores a RACH resource defined by this FeatureCombination is not supported by the UE or if any of the spare fields within the featureCombination is set to true.

messagePowerOffsetGroupB

Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on (see TS 38.321 [3], clause 5.1.2).

msqA-RSRP-Threshold

The UE selects 2-step random access type to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). This field is only present if both 2-step and 4-step RA type are configured for the concerned feature combination in the BWP. If configured, this parameter overrides *msgA-RSRP-Threshold-r16*. If absent, the UE applies *msgA-RSRP-Threshold-r16*, if configured

numberOfPreamblesPerSSB-ForThisPartition

It determines how many consecutive preambles are associated to the Feature Combination starting from the starting preamble(s) per SSB.

numberOfRA-PreamblesGroupA

It determines how many consecutive preambles per SSB are associated to Group A starting from the starting preamble(s). The remaining preambles associated to the Feature Combination are associated to Group B

ra-SizeGroupA

Transport Blocks size threshold in bits below which the UE shall use a contention-based RA preamble of group A. (see TS 38.321 [3], clause 5.1.2). If this feature combination preambles are associated to a RACH-ConfigCommon-twostepRA, this field correspond to ra-MsqA-SizeGroupA, otherwise it corresponds to ra-Msq3SizeGroupA.

rsrp-ThresholdSSB

L1-RSRP threshold used for determining whether a candidate beam may be used by the UE. If this parameter is included in *FeatureCombinationPreambles* which is included in *RACH-ConfigCommonTwoStepRA*, it corresponds to *msgA-RSRP-ThresholdSSB*, as defined in TS 38.321 [3]. If this parameter is included in *FeatureCombinationPreambles* which is included in *RACH-ConfigCommon*, it it corresponds to *rsrp-ThresholdSSB*, as defined in TS 38.321 [3].

separateMsgA-PUSCH-Config

If present it specifies how the 2-step RACH preambles identified by this *FeatureCombinationPreambles* are mapped to a PUSCH slot separate from the one defined in MsgA-ConfigCommon-r16. If the field is absent, the UE should apply the corresponding parameter in the *RACH-ConfigCommonTwoStepRA* of the BWP which includes the *FeatureCombinationPreambles IE*.

ssb-SharedRO-MaskIndex

Mask index (see TS 38.321 [3]).

Indicates a subset of ROs where preambles are allocated for this feature combination.

If this field is configured within FeatureCombinationPreambles which is included in RACH-ConfigCommonTwoStepRA:

- in case of separate ROs are configured for 4-step and 2-step random access, this field indicates a subset of ROs configured within this RACH-ConfigCommonTwoStepRA:
- in case shared ROs are used for 4-step and 2-step random access, it indicates the subset of ROs configured within *RACH-ConfigCommon*, which are the subset of ROs configured for 2-step random access.

This field is configured when there is more than one RO per SSB. If the field is absent, all ROs configured in RACH-ConfigCommon or RACH-ConfigCommonTwoStepRA containing this FeatureCombinationPreambles are shared.

startPreambleForThisPartition

It defines the first preamble associated with the Feature Combination. If the UE is provided with a number N of SSB block indexes associated with one PRACH occasion, and N<1, the first preamble in each PRACH occasion is the one having the same index as indicated by this field. If N>=1, N blocks of preambles associated with the Feature

Conditional Presence	Explanation
MsgAConfigCommon	The field is optionally present, Need S, if FeatureCombinationPreambles is included in RACH-ConfigCommonTwoStepRA.
	Otherwise, it is absent. If the field is absent in FeatureCombinationPreambles included in RACH-
	ConfigCommonTwoStepRA, the UE applies MsgA-PUSCH-Config included in the corresponding MsgA-ConfigCommon.

FilterCoefficient

The IE *FilterCoefficient* specifies the measurement filtering coefficient. Value $fc\theta$ corresponds to k = 0, $fc\theta$ corresponds to k = 1, and so on.

FilterCoefficient information element

```
-- ASN1START
-- TAG-FILTERCOEFFICIENT-START

FilterCoefficient ::= ENUMERATED { fc0, fc1, fc2, fc3, fc4, fc5, fc6, fc7, fc8, fc9, fc11, fc13, fc15, fc17, fc19, spare1, ...}

-- TAG-FILTERCOEFFICIENT-STOP
-- ASN1STOP
```

FreqBandIndicatorNR

The IE FreqBandIndicatorNR is used to convey an NR frequency band number as defined in TS 38.101-1 [15], TS 38.101-2 [39] and TS 38.101-5 [75].

FreqBandIndicatorNR information element

```
-- ASN1START
-- TAG-FREQBANDINDICATORNR-START

FreqBandIndicatorNR ::= INTEGER (1..1024)

-- TAG-FREQBANDINDICATORNR-STOP
-- ASN1STOP
```

FreqPriorityListDedicatedSlicing

The IE FreqPriorityListDedicatedSlicing provides dedicated cell reselection priorities for slicing in RRCRelease.

FreqPriorityListDedicatedSlicing information element

```
-- ASN1START
```

⁻⁻ TAG-FREQPRIORITYLISTDEDICATEDSLICING-START

```
FreqPriorityListDedicatedSlicing-r17 ::= SEOUENCE (SIZE (1.. maxFreq)) OF FreqPriorityDedicatedSlicing-r17
FreqPriorityDedicatedSlicing-r17 ::=
                                         SEOUENCE {
    dl-ExplicitCarrierFreg-r17
                                             ARFCN-ValueNR.
    sliceInfoListDedicated-r17
                                             SliceInfoListDedicated-r17
                                                                                                           OPTIONAL -- Cond Mandatory
SliceInfoListDedicated-r17 ::=
                                         SEQUENCE (SIZE (1..maxSliceInfo-r17)) OF SliceInfoDedicated-r17
SliceInfoDedicated-r17 ::=
                                         SEQUENCE {
    nsag-IdentityInfo-r17
                                             NSAG-IdentityInfo-r17,
                                             CellReselectionPriority
                                                                                                           OPTIONAL, -- Need R
    nsag-CellReselectionPriority-r17
    nsag-CellReselectionSubPriority-r17
                                             CellReselectionSubPriority
                                                                                                           OPTIONAL -- Need R
-- TAG-FREOPRIORITYLISTDEDICATEDSLICING-STOP
-- ASN1STOP
```

FreqPriorityDedicatedSlicing field descriptions

dl-ExplicitCarrierFreq

Indicates the downlink carrier frequency to which SliceInfoListDedicated is associated.

Conditional Presence	Explanation
Mandatory	The field is mandatory present.

- FreqPriorityListSlicing

The IE *FreqPriorityListSlicing* indicates cell reselection priorities for slicing in SIB16.

FreqPriorityListSlicing information element

```
-- ASN1START
-- TAG-FREOPRIORITYLISTSLICING-START
FreqPriorityListSlicing-r17 ::= SEQUENCE (SIZE (1..maxFreqPlus1)) OF FreqPrioritySlicing-r17
FreqPrioritySlicing-r17 ::=
                               SEOUENCE {
    dl-ImplicitCarrierFreq-r17
                                           INTEGER (0..maxFreq),
    sliceInfoList-r17
                                         SliceInfoList-r17
                                                                                                          OPTIONAL -- Cond Mandatory
SliceInfoList-r17 ::=
                                  SEQUENCE (SIZE (1..maxSliceInfo-r17)) OF SliceInfo-r17
SliceInfo-r17 ::=
                                  SEOUENCE {
    nsag-IdentityInfo-r17
                                      NSAG-IdentityInfo-r17,
   nsag-CellReselectionPriority-r17 CellReselectionPriority
                                                                                                          OPTIONAL, -- Need R
```

FreqPriorityListSlicing field descriptions

dl-ImplicitCarrierFreq

Indicates the downlink carrier frequency to which *sliceInfoList* is associated with. The frequency is signalled implicitly, value 0 corresponds to the serving frequency, value 1 corresponds to the first frequency indicated by the *InterFreqCarrierFreqList* in SIB4, and value 2 coresponds to the second frequency indicated by the *InterFreqCarrierFreqList* in SIB4, and so on.

SliceInfo field descriptions

sliceAllowedCellListNR

List of allow-listed cells for slicing. If present, the cells listed in this list support the corresponding nsag-frequency pair, and the cells not listed in this list do not support the corresponding nsag-frequency pair, according to TS 38.304 [20], clause 5.2.4.11.

sliceCellListNR

Contains either the list of allow-listed or exclude-listed cells for slicing. If absent, it implies all the cells support the corresponding nsag-frequency pair, according to 38.304 [20], clause 5.2.4.11.

sliceExcludedCellListNR

List of exclude-listed cells for slicing. If present, the cells listed in this list do not support the corresponding nsag-frequency pair, and the cells not listed in this list support the corresponding nsag-frequency pair, according to TS 38.304 [20], clause 5.2.4.11.

Conditional Presence	Explanation
Mandatory	The field is mandatory present.

FrequencyInfoDL

The IE *FrequencyInfoDL* provides basic parameters of a downlink carrier and transmission thereon.

FrequencyInfoDL information element

```
-- ASN1START
-- TAG-FREQUENCYINFODL-START

FrequencyInfoDL ::= SEQUENCE {
   absoluteFrequencySSB ARFCN-ValueNR OPTIONAL, -- Cond SpCellAdd frequencyBandList MultiFrequencyBandListNR,
```

```
absoluteFrequencyPointA scs-SpecificCarrierList SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier,
...
}
-- TAG-FREQUENCYINFODL-STOP
-- ASN1STOP
```

FrequencyInfoDL field descriptions

absoluteFrequencyPointA

Absolute frequency position of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A (see TS 38.211 [16], clause 4.4.4.2). Note that the lower edge of the actual carrier is not defined by this field but rather in the scs-SpecificCarrierList.

absoluteFrequencySSB

Frequency of the SSB to be used for this serving cell. SSB related parameters (e.g. SSB index) provided for a serving cell refer to this SSB frequency unless mentioned otherwise. The CD-SSB of the PCell is always on the sync raster. Frequencies are considered to be on the sync raster if they are also identifiable with a GSCN value (see TS 38.101-1 [15]). If the field is absent, the SSB related parameters should be absent, e.g. *ssb-PositionsInBurst*, *ssb-periodicityServingCell* and *subcarrierSpacing* in ServingCellConfigCommon IE. If the field is absent, the UE obtains timing reference from the SpCell or an SCell if applicable as described in TS 38.213 [13], clause 4.1. This is only supported in case the SCell for which the UE obtains the timing reference is in the same frequency band as the cell (i.e. the SpCell or the SCell, respectively) from which the UE obtains the timing reference.

For cells supporting RedCap, this field corresponds to the CD-SSB.

frequencyBandList

List containing only one frequency band to which this carrier(s) belongs. Multiple values are not supported.

scs-SpecificCarrierList

A set of carriers for different subcarrier spacings (numerologies). Defined in relation to Point A. The network configures a scs-SpecificCarrier at least for each numerology (SCS) that is used e.g. in a BWP (see TS 38.211 [16], clause 5.3).

Conditional Presence	Explanation
SpCellAdd	The field is mandatory present if this <i>FrequencyInfoDL</i> is for SpCell. Otherwise the field is optionally present, Need S.

FrequencyInfoDL-SIB

The IE FrequencyInfoDL-SIB provides basic parameters of a downlink carrier and transmission thereon.

FrequencyInfoDL-SIB information element

-- ASN1STOP

FrequencyInfoDL-SIB field descriptions

offsetToPointA

Represents the offset to Point A as defined in TS 38.211 [16], clause 4.4.4.2.

frequencyBandList

List of one or multiple frequency bands to which this carrier(s) belongs.

scs-SpecificCarrierList

A set of carriers for different subcarrier spacings (numerologies). Defined in relation to Point A (see TS 38.211 [16], clause 5.3). The network configures this for all SCSs that are used in DL BWPs in this serving cell.

FrequencyInfoUL

The IE FrequencyInfoUL provides basic parameters of an uplink carrier and transmission thereon.

FrequencyInfoUL information element

```
-- ASN1START
-- TAG-FREQUENCYINFOUL-START
FrequencyInfoUL ::=
                                   SEQUENCE {
                                       MultiFrequencyBandListNR
                                                                                                          -- Cond FDD-OrSUL
    frequencyBandList
                                                                                               OPTIONAL,
    absoluteFrequencyPointA
                                       ARFCN-ValueNR
                                                                                               OPTIONAL,
                                                                                                          -- Cond FDD-OrSUL
    scs-SpecificCarrierList
                                       SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier,
    additionalSpectrumEmission
                                       AdditionalSpectrumEmission
                                                                                               OPTIONAL,
                                                                                                          -- Need S
    p-Max
                                       P-Max
                                                                                               OPTIONAL,
                                                                                                          -- Need S
    frequencyShift7p5khz
                                       ENUMERATED {true}
                                                                                               OPTIONAL, -- Cond FDD-TDD-OrSUL-Optional
-- TAG-FREQUENCYINFOUL-STOP
-- ASN1STOP
```

FrequencyInfoUL field descriptions

absoluteFrequencyPointA

Absolute frequency of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A. Note that the lower edge of the actual carrier is not defined by this field but rather in the scs-SpecificCarrierList (see TS 38.211 [16], clause 4.4.4.2).

additionalSpectrumEmission

The additional spectrum emission requirements to be applied by the UE on this uplink. If the field is absent, the UE uses value 0 for the additional Spectrum Emission (see TS 38.101-1 [15], tables 6.2.3.1-1A, 6.2A.3.1.1-2 and 6.2A.3.1.2-2, and TS 38.101-2 [39], tables 6.2.3.1-2 and 6.2A.3.1-2). Network configures the same value in additional Spectrum Emission for all uplink carrier(s) of the same band with UL configured, except for additional Spectrum Emission value corresponding to NS_55/NS_57. If NS_55/NS_57 (see TS 38.101-1 [15], table 6.2.3.1-1) is applicable for at least one uplink carrier, the network may configure either NS_55/NS_57 or NS_01 for these uplink carriers, and NS_01 for the remaining uplink carrier(s) of band n77. The additional Spectrum Emission is applicable for all uplink carriers of the same band with UL configured.

frequencyBandList

List containing only one frequency band to which this carrier(s) belongs. Multiple values are not supported.

frequencyShift7p5khz

Enable the NR UL transmission with a 7.5 kHz shift to the LTE raster. If the field is absent, the frequency shift is disabled.

р-Мах

Maximum transmit power allowed in this serving cell. The maximum transmit power that the UE may use on this serving cell may be additionally limited by *p-NR-FR1* (configured for the cell group) and by *p-UE-FR1* (configured total for all serving cells operating on FR1). If absent, the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell or TS 38.101-2 [39] in case of an FR2 cell. In this release of the specification, if p-Max is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. Value in dBm. This field is ignored by IAB-MT, the IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63].

scs-SpecificCarrierList

A set of carriers for different subcarrier spacings (numerologies). Defined in relation to Point A. The network configures a scs-SpecificCarrier at least for each numerology (SCS) that is used e.g. in a BWP (see TS 38.211 [16], clause 5.3).

Conditional Presence	Explanation
FDD-OrSUL	The field is mandatory present if this <i>FrequencyInfoUL</i> is for the paired UL for a DL (defined in a <i>FrequencyInfoDL</i>) or if this <i>FrequencyInfoUL</i> is for a supplementary uplink (SUL). It is absent, Need R, otherwise (if this <i>FrequencyInfoUL</i> is for an unpaired UL (TDD).
FDD-TDD-OrSUL-Optional	The field is optionally present, Need R, if this <i>FrequencyInfoUL</i> is for the paired UL for a DL (defined in a <i>FrequencyInfoDL</i>), or if this <i>FrequencyInfoUL</i> is for an unpaired UL (TDD) in certain bands (as defined in clause 5.4.2.1 of TS 38.101-1 and in clause 5.4.2.1 of TS 38.104 [12]), or if this <i>FrequencyInfoUL</i> is for a supplementary uplink (SUL). It is absent, Need R, otherwise.

FrequencyInfoUL-SIB

The IE FrequencyInfoUL-SIB provides basic parameters of an uplink carrier and transmission thereon.

FrequencyInfoUL-SIB information element

```
-- ASN1START
-- TAG-FREQUENCYINFOUL-SIB-START

FrequencyInfoUL-SIB ::= SEQUENCE {
    frequencyBandList MultiFrequencyBandListNR-SIB OPTIONAL, -- Cond FDD-OrSUL absoluteFrequencyPointA ARFCN-ValueNR OPTIONAL, -- Cond FDD-OrSUL
```

```
scs-SpecificCarrierList
p-Max
frequencyShift7p5khz

TAG-FREQUENCYINFOUL-SIB-STOP
ASN1STOP
```

FrequencyInfoUL-SIB field descriptions

absoluteFrequencyPointA

Absolute frequency of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A. Note that the lower edge of the actual carrier is not defined by this field but rather in the scs-SpecificCarrierList (see TS 38.211 [16], clause 4.4.4.2).

frequencyBandList

Provides the frequency band indicator and a list of *additionalPmax* and *additionalSpectrumEmission* values as defined in TS 38.101-1 [15], table 6.2.3.1-1, and TS 38.101-2 [39], table 6.2.3.1-2. The UE shall apply the first listed band which it supports in the *frequencyBandList* field.

frequencyShift7p5khz

Enable the NR UL transmission with a 7.5 kHz shift to the LTE raster. If the field is absent, the frequency shift is disabled.

р-Мах

Value in dBm applicable for the cell. If absent the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell or TS 38.101-2 [39] in case of an FR2 cell. In this release of the specification, if p-Max is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. This field is ignored by IAB-MT, the IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63].

scs-SpecificCarrierList

A set of carriers for different subcarrier spacings (numerologies). Defined in relation to Point A (see TS 38.211 [16], clause 5.3). The network configures this for all SCSs that are used in UL BWPs configured in this serving cell.

Conditional Presence	Explanation
FDD-OrSUL	The field is mandatory present if this FrequencyInfoUL-SIB is for the paired UL for a DL (defined in a FrequencyInfoDL-SIB)
	or if this FrequencyInfoUL-SIB is for a supplementary uplink (SUL). It is absent otherwise (if this FrequencyInfoUL-SIB is for
	an unpaired UL (TDD).
FDD-TDD-OrSUL-Optional	The field is optionally present, Need R, if this FrequencyInfoUL-SIB is for the paired UL for a DL (defined in a
	FrequencyInfoDL-SIB), or if this FrequencyInfoUL-SIB is for an unpaired UL (TDD) in certain bands (as defined in clause
	5.4.2.1 of TS 38.101-1 and in clause 5.4.2.1 of TS 38.104 [12]), or if this FrequencyInfoUL-SIB is for a supplementary uplink
	(SUL). It is absent otherwise.

– GapPriority

The IE *GapPriority* is used to identify the priority of a gap configuration.

GapPriority information element

```
-- ASN1START
```

⁻⁻ TAG-GAPPRIORITY-START

```
GapPriority-r17 ::= INTEGER (1..maxNrOfGapPri-r17)

-- TAG-GAPPRIORITY-STOP

-- ASN1STOP
```

HighSpeedConfig

The IE *HighSpeedConfig* is used to configure parameters for high speed scenarios.

HighSpeedConfig information element

```
-- ASN1START
-- TAG-HIGHSPEEDCONFIG-START
HighSpeedConfig-r16 ::= SEOUENCE {
   highSpeedMeasFlag-r16
                        ENUMERATED {true}
                                              OPTIONAL,
                                                        -- Cond SpCellOnly
   OPTIONAL, -- Need R
HighSpeedConfig-v1700 ::= SEQUENCE {
   highSpeedMeasCA-Scell-r17
                            ENUMERATED {true}
                                                  OPTIONAL,
                                                            -- Cond SCellOnly
   highSpeedMeasInterFreq-r17 ENUMERATED {true}
                                                  OPTIONAL, -- Cond SpCellOnly2
                                                  OPTIONAL, -- Need R
   HighSpeedConfigFR2-r17 ::= SEQUENCE {
   highSpeedMeasFlagFR2-r17
                                         ENUMERATED {set1, set2}
                                                                                 OPTIONAL,
                                                                                           -- Need R
   highSpeedDeploymentTypeFR2-r17
                                         ENUMERATED {unidirectional, bidirectional}
                                                                                 OPTIONAL,
                                                                                           -- Need R
   highSpeedLargeOneStepUL-TimingFR2-r17
                                         ENUMERATED {true}
                                                                                 OPTIONAL, -- Need R
-- TAG-HIGHSPEEDCONFIG-STOP
-- ASN1STOP
```

HighSpeedConfig field descriptions

HighSpeedDemodCA-Scell

If the field is present and UE supports *demodulationEnhancementCA-r17*, the UE shall apply the enhanced demodulation processing for HST-SFN joint transmission scheme with velocity up to 500km/h as specified in TS 38.101-4 [59]. This parameter only applies to SCell.

highSpeedDemodFlag

If the field is present and UE supports *demodulationEnhancement-r16*, the UE shall apply the enhanced demodulation processing for HST-SFN joint transmission scheme with velocity up to 500km/h as specified in TS 38.101-4 [59]. This parameter only applies to SpCell.

highSpeedDeploymentTypeFR2

If the field is present, and field value is *unidirectional*, the UE shall assume uni-directional deployment or if field value is *birectional* the UE shall assume bidirectional deployment for FR2 up to 350km/h as specified in TS 38.133 [14].

highSpeedLargeOneSteptUL-TimingFR2

If the field is present, large one step UE autonomous uplink transmit timing adjustment for FR2 up to 350km/h as specified in TS 38.133 [14] is enabled.

highSpeedMeasCA-Scell

If the field is present and UE supports *measurementEnhancementCA-r17*, the UE shall apply the enhanced RRM requirements to the serving frequency of SCell for carrier aggregation to support high speed up to 500 km/h as specified in TS 38.133 [14].

highSpeedMeasFlag

If the field is present and UE supports measurementEnhancement-r16, the UE shall apply the enhanced intra-NR and inter-RAT EUTRAN RRM requirements to support high speed up to 500 km/h as specified in TS 38.133 [14].

If the field is present and UE supports intraNR-MeasurementEnhancement-r16, the UE shall apply enhanced intra-NR RRM requirement to support high speed up to 500 km/h as specified in TS 38.133 [14].

If the field is present and UE supports interRAT-MeasurementEnhancement-r16, the UE shall apply enhanced inter-RAT EUTRAN RRM requirement to support high speed up to 500 km/h as specified in TS 38.133 [14].

This parameter only applies to the serving frequency of SpCell.

highSpeedMeasFlagFR2

If the field is present, the UE shall apply enhanced intra-NR RRM requirement set one to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14], if the field value is set1 or RRM requirement set two if the field value is set2.

highSpeedMeasInterFreq

If the field is present and UE supports measurementEnhancementInterFreq-r17, the UE shall apply the enhanced RRM requirements for inter-frequency measurement in RRC_CONNECTED to support high speed up to 500 km/h as specified in TS 38.133 [14].

Conditional Presence	Explanation
SCellOnly	The field is optionally present, Need R, in ServingCellConfigCommon of an SCell. It is absent otherwise.
SpCellOnly	The field is optionally present, Need R, in ServingCellConfigCommonSIB or in the ServingCellConfigCommon of an SpCell. It is absent otherwise.
SpCellOnly2	The field is optionally present, Need R, in ServingCellConfigCommon of an SpCell. It is absent otherwise.

– Hysteresis

The IE *Hysteresis* is a parameter used within the entry and leave condition of an event triggered reporting condition. The actual value is field value * 0.5 dB.

Hysteresis information element

```
-- TAG-HYSTERESIS-START

Hysteresis ::= INTEGER (0..30)

-- TAG-HYSTERESIS-STOP

-- ASN1STOP
```

HysteresisLocation

The IE *HysteresisLocation* is a parameter used within entry and leave condition of a location based event triggered reporting condition. The actual value is field value * 10 meters.

HysteresisLocation information element

```
-- ASN1START
-- TAG-HYSTERESISLOCATION-START

HysteresisLocation-r17 ::= INTEGER (0..32768)

-- TAG-HYSTERESISLOCATION-STOP
-- ASN1STOP
```

InvalidSymbolPattern

The IE *InvalidSymbolPattern* is used to configure one invalid symbol pattern for PUSCH transmission repetition type B applicable for both DCI format 0_1 and 0_2, see TS 38.214 [19], clause 6.1.

InvalidSymbolPattern information element

```
-- ASN1START
-- TAG-INVALIDSYMBOLPATTERN-START
InvalidSymbolPattern-r16 ::= SEQUENCE {
                CHOICE {
BIT STRING (SIZE (14)),
BIT STRING (SIZE (28))
   symbols-r16
      oneSlot
       twoSlots
   n2
                                    BIT STRING (SIZE (2)),
      n4
                                    BIT STRING (SIZE (4)),
      n5
                                    BIT STRING (SIZE (5)),
      n8
                                    BIT STRING (SIZE (8)),
      n10
                                     BIT STRING (SIZE (10)),
      n20
                                     BIT STRING (SIZE (20)),
      n40
                                    BIT STRING (SIZE (40))
                                                              OPTIONAL, -- Need M
```

```
}
-- TAG-INVALIDSYMBOLPATTERN-STOP
-- ASN1STOP
```

InvalidSymbolPattern field descriptions

periodicityAndPattern

A time domain repetition pattern at which the pattern defined by *symbols* recurs. This slot pattern repeats itself continuously. When the field is not configured, the UE uses the value n1 (see TS 38.214 [19], clause 6.1).

symbols

A symbol level bitmap in time domain (see TS 38.214[19], clause 6.1).

For oneSlot, if ECP is configured, the first 12 bits represent the symbols within the slot and the last two bits within the bitstring are ignored by the UE; Otherwise, the 14 bits represent the symbols within the slot.

For *twoSlots*, if ECP is configured, the first 12 bits represent the symbols within the first slot and the next 12 bits represent the symbols in the second slot and the last four bits within the bit string are ignored by the UE; Otherwise, the first 14 bits represent the symbols within the first slot and the next 14 bits represent the symbols in the second slot. For the bits representing symbols in a slot, the most significant bit of the bit string represents the first symbol in the slot and the second most significant bit represents the second symbol in the slot and so on.

This pattern recurs (in time domain) with the configured periodicityAndPattern.

I-RNTI-Value

The IE I-RNTI-Value is used to identify the suspended UE context of a UE in RRC_INACTIVE.

I-RNTI-Value information element

```
-- ASN1START
-- TAG-I-RNTI-VALUE-START

I-RNTI-Value ::= BIT STRING (SIZE(40))

-- TAG-I-RNTI-VALUE-STOP
-- ASN1STOP
```

LBT-FailureRecoveryConfig

The IE *LBT-FailureRecoveryConfig-r16* is used to configure the parameters used for detection of consistent uplink LBT failures for operation with shared spectrum channel access, as specified in TS 38.321 [3].

LBT-FailureRecoveryConfig information element

```
-- ASN1START
-- TAG-LBT-FAILURERECOVERYCONFIG-START

LBT-FailureRecoveryConfig-r16 ::= SEQUENCE {
```

```
lbt-FailureInstanceMaxCount-r16
  lbt-FailureDetectionTimer-r16
  ...
}

ENUMERATED {n4, n8, n16, n32, n64, n128},
  ENUMERATED {ms10, ms20, ms40, ms80, ms160, ms320},
  ...
}

-- TAG-LBT-FAILURERECOVERYCONFIG-STOP
  -- ASN1STOP
```

LBT-FailureRecoveryConfig field descriptions

Ibt-FailureDetectionTimer

Timer for consistent uplink LBT failure detection (see TS 38.321 [3]). Value ms10 corresponds to 10 ms, value ms20 corresponds to 20 ms, and so on.

lbt-FailureInstanceMaxCount

This field determines after how many LBT failure indications received from the physical layer the UE triggers uplink LBT failure recovery (see TS 38.321 [3]). Value *n4* corresponds to 4, value *n8* corresponds to 8, and so on.

I ocationInfo

The IE LocationInfo is used to transfer available detailed location information, Bluetooth, WLAN and sensor available measurement results at the UE.

LocationInfo information element

```
-- ASN1START
-- TAG-LOCATIONINFO-START
LocationInfo-r16 ::=
                         SEOUENCE {
    commonLocationInfo-r16
                             CommonLocationInfo-r16
                                                             OPTIONAL,
   bt-LocationInfo-r16
                             LogMeasResultListBT-r16
                                                             OPTIONAL,
    wlan-LocationInfo-r16
                             LogMeasResultListWLAN-r16
                                                             OPTIONAL,
    sensor-LocationInfo-r16 Sensor-LocationInfo-r16
                                                             OPTIONAL,
-- TAG-LOCATIONINFO-STOP
-- ASN1STOP
```

LocationMeasurementInfo

The IE LocationMeasurementInfo defines the information sent by the UE to the network to assist with the configuration of measurement gaps for location related measurements.

LocationMeasurementInfo information element

```
-- ASN1START
-- TAG-LOCATIONMEASUREMENTINFO-START
LocationMeasurementInfo ::= CHOICE {
```

```
EUTRA-RSTD-InfoList,
    eutra-RSTD
    eutra-FineTimingDetection NULL,
    nr-PRS-Measurement-r16
                               NR-PRS-MeasurementInfoList-r16
EUTRA-RSTD-InfoList ::= SEQUENCE (SIZE (1..maxInterRAT-RSTD-Freq)) OF EUTRA-RSTD-Info
EUTRA-RSTD-Info ::= SEQUENCE {
                               ARFCN-ValueEUTRA,
    carrierFreq
    measPRS-Offset
                               INTEGER (0..39),
    . . .
NR-PRS-MeasurementInfoList-r16 ::= SEQUENCE (SIZE (1..maxFreqLayers)) OF NR-PRS-MeasurementInfo-r16
NR-PRS-MeasurementInfo-r16 ::=
                                   SEOUENCE {
    dl-PRS-PointA-r16
                                       ARFCN-ValueNR,
    nr-MeasPRS-RepetitionAndOffset-r16 CHOICE {
       ms20-r16
                                           INTEGER (0..19),
       ms40-r16
                                           INTEGER (0..39),
       ms80-r16
                                           INTEGER (0..79),
       ms160-r16
                                           INTEGER (0..159),
       . . .
    nr-MeasPRS-length-r16
                                       ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6, ms10, ms20},
-- TAG-LOCATIONMEASUREMENTINFO-STOP
-- ASN1STOP
```

LocationMeasurementInfo field descriptions

carrierFreq

The EARFCN value of the carrier received from upper layers for which the UE needs to perform the inter-RAT RSTD measurements.

measPRS-Offset

Indicates the requested gap offset for performing RSTD measurements towards E-UTRA. It is the smallest subframe offset from the beginning of subframe 0 of SFN=0 of the serving cell of the requested gap for measuring PRS positioning occasions in the carrier frequency *carrierFreq* for which the UE needs to perform the inter-RAT RSTD measurements. The PRS positioning occasion information is received from upper layers. The value of *measPRS-Offset* is obtained by mapping the starting subframe of the PRS positioning occasion in the measured cell onto the corresponding subframe in the serving cell and is calculated as the serving cell's number of subframes from SFN=0 mod 40.

The UE shall take into account any additional time required by the UE to start PRS measurements on the other carrier when it does this mapping for determining the meas PRS-Offset.

NOTE: Figure 6.2.2-1 in TS 36.331[10] illustrates the measPRS-Offset field.

dl-PRS-PointA

The ARFCN value of the carrier received from upper layers for which the UE needs to perform the NR DL-PRS measurements.

nr-MeasPRS-RepetitionAndOffset

Indicates the gap periodicity in ms and offset in number of subframes of the requested measurement gap for performing NR DL-PRS measurements.

nr-MeasPRS-length

Indicates measurement gap length in ms of the requested measurement gap for performing NR DL-PRS measurements. The measurement gap length is according to in Table 9.1.2-1 in TS 38.133 [14].

LogicalChannelConfig

The IE LogicalChannelConfig is used to configure the logical channel parameters.

LogicalChannelConfig information element

```
-- ASN1START
-- TAG-LOGICALCHANNELCONFIG-START
LogicalChannelConfig ::=
                                   SEOUENCE {
    ul-SpecificParameters
                                       SEOUENCE {
       priority
                                           INTEGER (1..16),
       prioritisedBitRate
                                           ENUMERATED {kBps0, kBps8, kBps16, kBps32, kBps64, kBps128, kBps256, kBps512,
                                           kBps1024, kBps2048, kBps4096, kBps8192, kBps16384, kBps32768, kBps65536, infinity},
       bucketSizeDuration
                                           ENUMERATED {ms5, ms10, ms20, ms50, ms100, ms150, ms300, ms500, ms1000,
                                                           spare7, spare6, spare5, spare4, spare3, spare2, spare1},
                                           SEQUENCE (SIZE (1..maxNrofServingCells-1)) OF ServCellIndex
       allowedServingCells
                                                                                                           OPTIONAL, -- Cond PDCP-CADuplication
                                                                                                               OPTIONAL, -- Need R
       allowedSCS-List
                                           SEQUENCE (SIZE (1..maxSCSs)) OF SubcarrierSpacing
                                           ENUMERATED {ms0p02, ms0p04, ms0p0625, ms0p125, ms0p25, ms0p5, ms0p01-v1700, spare1}
       maxPUSCH-Duration
                                                                                                               OPTIONAL, -- Need R
       configuredGrantType1Allowed
                                           ENUMERATED {true}
                                                                                                               OPTIONAL, -- Need R
       logicalChannelGroup
                                           INTEGER (0..maxLCG-ID)
                                                                                                               OPTIONAL, -- Need R
                                                                                                               OPTIONAL, -- Need R
        schedulingRequestID
                                           SchedulingRequestId
       logicalChannelSR-Mask
                                           BOOLEAN,
       logicalChannelSR-DelayTimerApplied BOOLEAN,
                                       ENUMERATED {s0, s0dot4, s0dot8, s1dot6, s3, s6, s12, s30}
       bitRateQueryProhibitTimer
                                                                                                               OPTIONAL,
                                                                                                                            -- Need R
```

```
allowedCG-List-r16
                                          SEQUENCE (SIZE (0.. maxNrofConfiguredGrantConfigMAC-1-r16)) OF ConfiguredGrantConfigIndexMAC-r16
                                                                                                            OPTIONAL, -- Need S
       allowedPHY-PriorityIndex-r16
                                          ENUMERATED {p0, p1}
                                                                                                            OPTIONAL -- Need S
       ]],
       ] ]
                                          INTEGER (0..maxLCG-ID-IAB-r17)
       logicalChannelGroupIAB-Ext-r17
                                                                                                            OPTIONAL, -- Need R
       allowedHARQ-mode-r17
                                          ENUMERATED {harqModeA, harqModeB}
                                                                                                            OPTIONAL -- Need R
       ]]
                                                                                                        OPTIONAL, -- Cond UL
    ] ]
    channelAccessPriority-r16
                                      INTEGER (1..4)
                                                                                                        OPTIONAL, -- Need R
   bitRateMultiplier-r16
                                      ENUMERATED {x40, x70, x100, x200}
                                                                                                        OPTIONAL
                                                                                                                  -- Need R
    ]]
-- TAG-LOGICALCHANNELCONFIG-STOP
-- ASN1STOP
```

LogicalChannelConfig field descriptions

allowedCG-List

This restriction applies only when the UL grant is a configured grant. If present, UL MAC SDUs from this logical channel can only be mapped to the indicated configured grant configuration. If the size of the sequence is zero, then UL MAC SDUs from this logical channel cannot be mapped to any configured grant configurations. If the field is not present, UL MAC SDUs from this logical channel can be mapped to any configured grant configurations. If the field configuredGrantType1Allowed is present, only those configured grant type 1 configuration indicated in this sequence are allowed for use by this logical channel; otherwise, this sequence shall not include any configured grant type 1 configuration. Corresponds to "allowedCG-List" as specified in TS 38.321 [3].

allowedHARQ-mode

Indicates the allowed HARQ mode of a HARQ process mapped to this logical channel. If the parameter is absent, there is no restriction for HARQ mode for the mapping. This field applies to SRB1, SRB2 and DRBs.

allowedPHY-PriorityIndex

This restriction applies only when the UL grant is a dynamic grant. If the field is present and the dynamic grant has a PHY-priority index, UL MAC SDUs from this logical channel can only be mapped to the dynamic grants indicating PHY-priority index equal to the values configured by this field. If the field is present and the dynamic grant does not have a PHY-priority index, UL MAC SDUs from this logical channel can only be mapped to this dynamic grant if the value of the field is *p0*, see TS 38.213 [13], clause 9. If the field is not present, UL MAC SDUs from this logical channel can be mapped to any dynamic grants. Corresponds to "allowedPHY-PriorityIndex" as specified in TS 38.321 [3].

allowedSCS-List

If present, UL MAC SDUs from this logical channel can only be mapped to the indicated numerology. Otherwise, UL MAC SDUs from this logical channel can be mapped to any configured numerology. Corresponds to 'allowedSCS-List' as specified in TS 38.321 [3].

Only the following values are applicable depending on the used frequency:

FR1: 15, 30, or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

allowedServingCells

If present, UL MAC SDUs from this logical channel can only be mapped to the serving cells indicated in this list. Otherwise, UL MAC SDUs from this logical channel can be mapped to any configured serving cell of this cell group. Corresponds to 'allowedServingCells' in TS 38.321 [3].

bitRateMultiplier

Bit rate multiplier for recommended bit rate MAC CE as specified in TS 38.321 [3]. Value x40 indicates bit rate multiplier 40, value x70 indicates bit rate multiplier 70 and so on.

bitRateQueryProhibitTimer

The timer is used for bit rate recommendation query in TS 38.321 [3], in seconds. Value s0 means 0 s, s0dot4 means 0.4 s and so on.

bucketSizeDuration

Value in ms. ms5 corresponds to 5 ms, value ms10 corresponds to 10 ms, and so on.

channelAccessPriority

Indicates the Channel Access Priority Class (CAPC), as specified in TS 38.300 [2], to be used on uplink transmissions for operation with shared spectrum channel access in FR1. The network configures this field only for SRB2 and DRBs.

configuredGrantType1Allowed

If present, or if the capability *lcp-Restriction* as specified in TS 38.306 [26] is not supported, UL MAC SDUs from this logical channel can be transmitted on a configured grant type 1. Otherwise, UL MAC SDUs from this logical channel cannot be transmitted on a configured grant type 1. Corresponds to 'configuredGrantType1Allowed' in TS 38.321 [3].

logicalChannelGroup, logicalChannelGroupIAB-Ext

ID of the logical channel group, as specified in TS 38.321 [3], which the logical channel belongs to. The logicalChannelGroupIAB-Ext is only applicable to the IAB-MT. When logicalChannelGroupIAB-Ext is configured, logicalChannelGroup shall be ignored.

logicalChannelSR-Mask

Controls SR triggering when a configured uplink grant of *type1* or *type2* is configured. *true* indicates that SR masking is configured for this logical channel as specified in TS 38.321 [3].

logicalChannelSR-DelayTimerApplied

Indicates whether to apply the delay timer for SR transmission for this logical channel. Set to false if logicalChannelSR-DelayTimer is not included in BSR-Config.

maxPUSCH-Duration

If present, UL MAC SDUs from this logical channel can only be transmitted using uplink grants that result in a PUSCH duration shorter than or equal to the duration indicated by this field. Otherwise, UL MAC SDUs from this logical channel can be transmitted using an uplink grant resulting in any PUSCH duration. Corresponds to "maxPUSCH-Duration" in TS 38.321 [3]. The PUSCH duration is calculated based on the same length of all symbols, and the shortest length applies if the symbol lengths are different.

priority

Logical channel priority, as specified in TS 38.321 [3].

prioritisedBitRate

Value in kiloBytes/s. Value *kBps0* corresponds to 0 kiloBytes/s, value *kBps8* corresponds to 8 kiloBytes/s, value *kBps16* corresponds to 16 kiloBytes/s, and so on. For SRBs, the value can only be set to *infinity*.

schedulingRequestId

If present, it indicates the scheduling request configuration applicable for this logical channel, as specified in TS 38.321 [3].

Conditional Presence	Explanation
PDCP-CADuplication	The field is mandatory present if the DRB/SRB associated with this logical channel is configured with PDCP CA duplication
	in UL in the cell group in which this IE is included (i.e. the PDCP entity is associated with multiple RLC entities belonging to
	this cell group). Otherwise the field is optionally present, need R.
UL	The field is mandatory present for a logical channel with uplink if it serves DRB. It is optionally present, Need R, for a logical
	channel with uplink if it serves an SRB. Otherwise it is absent.

LogicalChannelIdentity

The IE *LogicalChannelIdentity* is used to identify one logical channel (*LogicalChannelConfig*) and the corresponding RLC bearer (*RLC-BearerConfig*) or BH RLC channel (*BH-RLC-ChannelConfig*) or Uu Relay RLC channel (*Uu-RelayRLC-ChannelConfig*) or PC5 Relay RLC channel (*SL-RLC-ChannelConfig*).

LogicalChannelIdentity information element

- -- ASN1START
- -- TAG-LOGICALCHANNELIDENTITY-START

LogicalChannelIdentity ::=

INTEGER (1..maxLC-ID)

- -- TAG-LOGICALCHANNELIDENTITY-STOP
- -- ASN1STOP

LTE-NeighCellsCRS-AssistInfoList

The IE *LTE-NeighCellsCRS-AssistInfoList-r17* is used to provide configuration information of neighbour LTE cells to assist the UE to perform CRS interference mitigation (CRS-IM) in scenarios with overlapping spectrum for LTE and NR.

LTE-NeighCellsCRS-AssistInfoList information element

- -- ASN1START
- -- TAG-LTE-NEIGHCELLSCRS-ASSISTINFOLIST-START

```
LTE-NeighCellsCRS-AssistInfoList-r17 ::= SEOUENCE (SIZE (1..maxNrofCRS-IM-InterfCell-r17)) OF LTE-NeighCellsCRS-AssistInfo-r17
LTE-NeighCellsCRS-AssistInfo-r17 ::= SEQUENCE {
   neighCarrierBandwidthDL-r17
neighCarrierFreqDL-r17
                                            ENUMERATED {n6, n15, n25, n50, n75, n100, spare2, spare1}
                                                                                                         OPTIONAL. -- Cond CRS-IM
                                            INTEGER (0..16383)
                                                                                                         OPTIONAL, -- Need S
   neighCellId-r17
                                            EUTRA-PhysCellId
                                                                                                         OPTIONAL, -- Need S
                                            ENUMERATED {enabled}
   neighCRS-muting-r17
                                                                                                         OPTIONAL, -- Need R
   neighMBSFN-SubframeConfigList-r17
neighNrofCRS-Ports-r17
                                            EUTRA-MBSFN-SubframeConfigList
                                                                                                         OPTIONAL, -- Need S
                                             ENUMERATED {n1, n2, n4}
                                                                                                         OPTIONAL, -- Need S
   neighV-Shift-r17
                                             ENUMERATED {n0, n1, n2, n3, n4, n5}
                                                                                                         OPTIONAL -- Cond NotCellID
-- TAG-LTE-NEIGHCELLSCRS-ASSISTINFOLIST-STOP
-- ASN1STOP
```

LTE-NeighCellsCRS-AssistInfo field descriptions

neighCarrierBandwidthDL

Indicates the channel bandwidth of the neighbour LTE cell in number of PRBs. If the field is absent, the UE applies the value of *carrierBandwidthDL* indicated in *RateMatchPatternLTE-CRS* for this serving cell, if configured.

neighCarrierFreqDL

Indicates the downlink centre frequency of the neighbour LTE cell. If the field is absent, the UE applies the value of carrierFreqDL indicated in RateMatchPatternLTE-CRS for this serving cell, if configured.

neighCellId

Indicates the physical cell ID of the neighbour LTE cell for which the other fields within the same LTE-NeighCellsCRS-AssistInfo apply.

If the IE LTE-NeighCellsCRS-AssistInfoList contains multiple list entries, either this field or neighV-Shift is included in each instance.

If the IE LTE-NeighCellsCRS-AssistInfoList contains multiple list entries, the entry with neighV-Shift is only used for neighbour LTE cells for which neighCellId is not provided (i.e. the entry with neighCellId takes precedence over the entry with neighV-Shift, if provided).

If the IE LTE-NeighCellsCRS-AssistInfoList contains one list entry with neither this field nor neighV-Shift, the information within the entry applies to all neighbour LTE cells.

neighCRS-muting

Indicates whether the CRS interference mitigation is enabled in the neighbour LTE cell, as specified in TS 36.133 [40], clause 3.6.1.1.

neighMBSFN-SubframeConfigList

Indicates the MBSFN subframe configuration of the neighbour LTE cell. If RateMatchPatternLTE-CRS is configured for this serving cell and the field is absent, the UE applies the value of mbsfn-SubframeConfigList indicated in RateMatchPatternLTE-CRS for this serving cell if configured; otherwise, if the field is absent, the UE assumes MBSFN is not configured in the neighbour LTE cell.

neighNrofCRS-Ports

Indicates the CRS antenna ports number of the neighbour LTE cell. If the field is absent, the UE applies the value of *nrofCRS-Ports* indicated in *RateMatchPatternLTE-CRS* for this serving cell, if configured. If *RateMatchPatternLTE-CRS* is not configured for this serving cell and the field is absent, the UE applies the default value n4.

neighV-Shift

Indicates the shifting value v-shift of neighbour LTE cells for which the other fields within the same LTE-NeighCellsCRS-AssistInfo apply.

Conditional Presence	Explanation
CRS-IM	For the serving cell with 15kHz SCS, this field is mandatory present for the UE supporting the capability of crs-IM-nonDSS-
	NWA-15kHzSCS-r17, but not supporting crs-IM-nonDSS-15kHzSCS-r17, if RateMatchPatternLTE-CRS is not configured for
	this serving cell. Otherwise it is optionally present, Need S if RateMatchPatternLTE-CRS is configured for this serving cell;
	Need M otherwise.
	For the serving cell with 30kHz SCS, this field is mandatory present for the UE supporting the capability of crs-IM-nonDSS-
	NWA-30kHzSCS-r17, but not supporting crs-IM-nonDSS-30kHzSCS-r17, if RateMatchPatternLTE-CRS is not configured for
	this serving cell. Otherwise it is optionally present, Need S if RateMatchPatternLTE-CRS is configured for this serving cell;
	Need M otherwise.
NotCellID	If the field neighCellId is present, this field shall be absent; otherwise, it is optionally present if the IE LTE-NeighCellsCRS-
	AssistInfoList contains one list entry, Need S, or it is mandatory present if the IE LTE-NeighCellsCRS-AssistInfoList contains
	multiple list entries.

MAC-CellGroupConfig

The IE MAC-CellGroupConfig is used to configure MAC parameters for a cell group, including DRX.

MAC-CellGroupConfig information element

```
-- ASN1START
-- TAG-MAC-CELLGROUPCONFIG-START
MAC-CellGroupConfig ::=
                                  SEOUENCE {
   drx-Config
                                      SetupRelease { DRX-Config }
                                                                                                    OPTIONAL, -- Need M
                                      SchedulingRequestConfig
    schedulingRequestConfig
                                                                                                    OPTIONAL, -- Need M
   bsr-Config
                                      BSR-Config
                                                                                                    OPTIONAL, -- Need M
    tag-Config
                                      TAG-Config
                                                                                                    OPTIONAL, -- Need M
                                      SetupRelease { PHR-Config }
   phr-Config
                                                                                                    OPTIONAL,
                                                                                                              -- Need M
    skipUplinkTxDynamic
                                      BOOLEAN,
    ] ]
                                      BOOLEAN
   csi-Mask
                                                                                                    OPTIONAL,
                                                                                                              -- Need M
   dataInactivityTimer
                                      SetupRelease { DataInactivityTimer }
                                                                                                               -- Cond MCG-Only
   ]],
    11
   usePreBSR-r16
                                      ENUMERATED {true}
                                                                                                    OPTIONAL,
                                                                                                              -- Need R
                                      SchedulingRequestId
    schedulingRequestID-LBT-SCell-r16
                                                                                                    OPTIONAL, -- Need R
                                      ENUMERATED {enabled}
                                                                                                    OPTIONAL, -- Need R
   lch-BasedPrioritization-r16
                                      SchedulingRequestId
                                                                                                    OPTIONAL, -- Need R
    schedulingRequestID-BFR-SCell-r16
    drx-ConfigSecondaryGroup-r16
                                      SetupRelease { DRX-ConfigSecondaryGroup-r16 }
                                                                                                    OPTIONAL
                                                                                                              -- Need M
   ]],
    ] ]
    enhancedSkipUplinkTxDynamic-r16
                                      ENUMERATED {true}
                                                                                                    OPTIONAL,
                                                                                                               -- Need R
    OPTIONAL
                                                                                                               -- Need R
    ]],
    11
   intraCG-Prioritization-r17
                                      ENUMERATED {enabled}
                                                                                OPTIONAL,
                                                                                             -- Cond LCH-PrioWithReTxTimer
   drx-ConfiqSL-r17
                                      SetupRelease { DRX-ConfigSL-r17 }
                                                                                OPTIONAL,
                                                                                             -- Need M
   drx-ConfigExt-v1700
                                      SetupRelease { DRX-ConfigExt-v1700 }
                                                                                             -- Need M
                                                                                OPTIONAL,
```

```
schedulingRequestID-BFR-r17
                                        SchedulingRequestId
                                                                                    OPTIONAL,
                                                                                                 -- Need R
    schedulingRequestID-BFR2-r17
                                        SchedulingRequestId
                                                                                    OPTIONAL.
                                                                                                 -- Need R
    schedulingRequestConfig-v1700
                                        SchedulingRequestConfig-v1700
                                                                                    OPTIONAL.
                                                                                                 -- Need M
                                        SetupRelease { TAR-Config-r17 }
    tar-Config-r17
                                                                                                        OPTIONAL,
                                                                                                                     -- Need M
    q-RNTI-ConfiqToAddModList-r17
                                        SEQUENCE (SIZE (1..maxG-RNTI-r17)) OF MBS-RNTI-SpecificConfig-r17
                                                                                                                OPTIONAL.
                                                                                                                              -- Need N
    g-RNTI-ConfigToReleaseList-r17
                                        SEQUENCE (SIZE (1..maxG-RNTI-r17)) OF MBS-RNTI-SpecificConfigId-r17
                                                                                                                OPTIONAL,
                                                                                                                              -- Need N
    g-CS-RNTI-ConfigToAddModList-r17
                                        SEQUENCE (SIZE (1..maxG-CS-RNTI-r17)) OF MBS-RNTI-SpecificConfig-r17
                                                                                                                OPTIONAL,
                                                                                                                              -- Need N
                                        SEQUENCE (SIZE (1..maxG-CS-RNTI-r17)) OF MBS-RNTI-SpecificConfigId-r17 OPTIONAL,
    g-CS-RNTI-ConfigToReleaseList-r17
                                                                                                                             -- Need N
    allowCSI-SRS-Tx-MulticastDRX-Active-r17 BOOLEAN
                                                                                                                 OPTIONAL
                                                                                                                              -- Need M
    11,
    ] ]
    schedulingRequestID-PosMG-Request-r17 SchedulingRequestId
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
    drx-LastTransmissionUL-r17
                                        ENUMERATED {enabled}
                                                                                                                 OPTIONAL
                                                                                                                              -- Need R
    11
DataInactivityTimer ::=
                                ENUMERATED {s1, s2, s3, s5, s7, s10, s15, s20, s40, s50, s60, s80, s100, s120, s150, s180}
MBS-RNTI-SpecificConfig-r17 ::=
                                       SEOUENCE {
    mbs-RNTI-SpecificConfigId-r17
                                           MBS-RNTI-SpecificConfigId-r17,
    groupCommon-RNTI-r17
                                           CHOICE {
       g-RNTI
                                               RNTI-Value,
        g-CS-RNTI
                                               RNTI-Value
    drx-ConfiqPTM-r17
                                           SetupRelease { DRX-ConfigPTM-r17 }
                                                                                                       OPTIONAL,
                                                                                                                   -- Need M
    harq-FeedbackEnablerMulticast-r17
                                           ENUMERATED {dci-enabler, enabled}
                                                                                                       OPTIONAL,
                                                                                                                    -- Need S
                                                                                                                    -- Cond HARQFeedback
    harg-FeedbackOptionMulticast-r17
                                           ENUMERATED {ack-nack, nack-only}
                                                                                                       OPTIONAL,
    pdsch-AggregationFactor-r17
                                           ENUMERATED {n2, n4, n8}
                                                                                                       OPTIONAL
                                                                                                                    -- Cond G-RNTI
MBS-RNTI-SpecificConfigId-r17 ::= INTEGER (0..maxG-RNTI-1-r17)
-- TAG-MAC-CELLGROUPCONFIG-STOP
-- ASN1STOP
```

MAC-CellGroupConfig field descriptions

allowCSI-SRS-Tx-MulticastDRX-Active

Used to control the CSI/SRS transmission during MBS multicast DRX ActiveTime, see TS 38.321 [3].

csi-Mask

If set to true, the UE limits CSI reports to the on-duration period of the DRX cycle, see TS 38.321 [3].

datalnactivityTimer

Releases the RRC connection upon data inactivity as specified in clause 5.3.8.5 and in TS 38.321 [3]. Value s1 corresponds to 1 second, value s2 corresponds to 2 seconds, and so on.

drx-Config, drx-ConfigExt

Used to configure DRX as specified in TS 38.321 [3]. Network only configures drx-ConfigExt when drx-Config is configured.

drx-ConfigSecondaryGroup

Used to configure DRX related parameters for the second DRX group as specified in TS 38.321 [3]. The network does not configure secondary DRX group with DCP simultaneously nor secondary DRX group with a dormant BWP simultaneously.

drx-ConfigSL

Used to configure additional DRX parameters for the UE performing sidelink operation with resource allocation mode 1, as specified in TS 38.321 [3]. Network only configures this field if sl-ScheduledConfig is configured and drx-Config is configured.

drx-LastTransmissionUL

If this field is present, the start of the drx-HARQ-RTT-TimerUL is after the last transmission within a bundle, see TS 38.321 [3].

g-RNTI-ConfigToAddModList

List of G-RNTI configurations to add or modify. Up to 8 G-RNTIs can be configured in total in this release based on the UE capability.

g-RNTI-ConfigToReleaseList

List of G-RNTI configurations to release.

g-CS-RNTI-ConfigToAddModList

List of G-CS-RNTI configurations to add or modify. Up to 8 G-CS-RNTIs can be configured in total in this release based on the UE capability.

g-CS-RNTI-ConfigToReleaseList

List of G-CS-RNTI configurations to release.

intraCG-Prioritization

Used to enable HARQ process ID selection based on LCH-priority for one CG as specified in TS 38.321 [3].

Ich-BasedPrioritization

If this field is present, the corresponding MAC entity of the UE is configured with prioritization between overlapping grants and between scheduling request and overlapping grants based on LCH priority, see TS 38.321 [3]. The network does not configure *lch-BasedPrioritization* with *enhancedSkipUplinkTxDynamic* simultaneously nor *lch-BasedPrioritization* with *enhancedSkipUplinkTxConfigured* simultaneously.

schedulingRequestID-BFR-SCell

Indicates the scheduling request configuration applicable for BFR on SCell, as specified in TS 38.321 [3].

scheduling Request ID-BFR

Indicates the scheduling request configuration (SchedulingRequestConfig) that the UE shall use upon detecting a beam failure on the detection resources configured in failureDetectionSet1 of a serving cell while beam failure is not detected on resources configured in failureDetectionSet2 of the same serving cell.

schedulingRequestID-BFR2

Indicates the scheduling request configuration (SchedulingRequestConfig) that the UE shall use upon detecting a beam failure on the detection resources configured in failureDetectionSet2 of a serving cell while beam failure is not detected on resources configured in failureDetectionSet1 of the same serving cell.

schedulingRequestID-LBT-SCell

Indicates the scheduling request configuration applicable for consistent uplink LBT recovery on SCell, as specified in TS 38.321 [3].

schedulingRequestID-PosMG-Request

Indicates the scheduling request configuration applicable for Positioning Measurement Gap Activation/Deactivation Request, as specified in TS 38.321 [3].

skipUplinkTxDynamic, enhancedSkipUplinkTxDynamic, enhancedSkipUplinkTxConfigured

If set to *true*, the UE skips UL transmissions as described in TS 38.321 [3]. If the UE is configured with *enhancedSkipUplinkTxDynamic* or *enhancedSkipUplinkTxConfigured* with value *true*, REPETITION_NUMBER (as specified in TS 38.321 [3], clause 5.4.2.1) of the corresponding PUSCH transmission of the uplink grant shall be equal to 1.

tag-Config

The field is used to configure parameters for a time-alignment group. The field is not present if any DAPS bearer is configured.

usePreBSR

If set to true, the MAC entity of the IAB-MT may use the Pre-emptive BSR, see TS 38.321 [3].

MBS-RNTI-SpecificConfig field descriptions

drx-ConfigPTM

Used to configure DRX for PTM transmission as specified in TS 38.321 [3].

g-CS-RNTI

Used to scramble the SPS group-common PDSCH and activation/deactivation of SPS group-common PDSCH for one or more MBS multicast services.

g-RNTI

Used to scramble the scheduling and transmission of PTM for one or more MBS multicast services.

groupCommon-RNTI

Used to configure g-RNTI or g-CS-RNTI.

harg-FeedbackEnablerMulticast

Indicates whether the UE shall provide HARQ feedback for MBS multicast. Value *dci-enabler* means that whether the UE shall provide HARQ feedback for MBS multicast is indicated by DCI as specified in TS 38.213 [13]. Value *enabled* means the UE shall always provide HARQ feedback for MBS multicast. When the field is absent, the UE does not provide HARQ feedback for MBS multicast (see TS 38.213 [13], clause 18).

harq-FeedbackOptionMulticast

Indicates the feedback mode for MBS multicast dynamically scheduled PDSCH or SPS PDSCH.

mbs-RNTI-SpecificConfigId

An identifier of the RNTI specific configuration for MBS multicast.

pdsch-AggregationFactor

Number of repetitions for dynamically scheduled MBS multicast data (see TS 38.214 [19], clause 5.1.2.1). When the field is absent and *groupCommon-RNTI* is set to *g-RNTI*, the UE applies the value 1.

Conditional Presence	Explanation
G-RNTI	This field is optionally present, Need S, if <i>groupCommon-RNTI</i> is set to <i>g-RNTI</i> . The field is absent when <i>groupCommon-RNTI</i> is set to <i>g-CS-RNTI</i> .
HARQFeedback	The field is mandatory present when harq-FeedbackEnablerMulticast is present. It is absent otherwise.
MCG-Only	This field is optionally present, Need M, for the MAC-CellGroupConfig of the MCG. It is absent otherwise.
LCH-PrioWithReTxTimer	This field is optionally present, Need R, if Ich-BasedPrioritization-r16 is configured in this MAC entity and cg- RetransmissionTimer-r16 is configured for any configured grant configuration associated with this MAC entity. It is absent otherwise, Need R.

MeasConfig

The IE *MeasConfig* specifies measurements to be performed by the UE, and covers intra-frequency, inter-frequency and inter-RAT mobility as well as configuration of measurement gaps.

MeasConfig information element

```
-- ASN1START
-- TAG-MEASCONFIG-START
MeasConfig ::=
                                   SEQUENCE {
   measObjectToRemoveList
                                       MeasObjectToRemoveList
                                                                                                          OPTIONAL, -- Need N
   measObjectToAddModList
                                       MeasObjectToAddModList
                                                                                                          OPTIONAL, -- Need N
    reportConfigToRemoveList
                                       ReportConfigToRemoveList
                                                                                                          OPTIONAL, -- Need N
    reportConfigToAddModList
                                       ReportConfigToAddModList
                                                                                                          OPTIONAL, -- Need N
                                       MeasIdToRemoveList
                                                                                                          OPTIONAL, -- Need N
    measIdToRemoveList
    measIdToAddModList.
                                       MeasIdToAddModList.
                                                                                                          OPTIONAL, -- Need N
    s-MeasureConfig
                                       CHOICE {
       ssb-RSRP
                                           RSRP-Range,
       csi-RSRP
                                           RSRP-Range
                                                                                                          OPTIONAL, -- Need M
    quantityConfig
                                       QuantityConfig
                                                                                                          OPTIONAL, -- Need M
    measGapConfig
                                       MeasGapConfig
                                                                                                          OPTIONAL, -- Need M
    measGapSharingConfig
                                       MeasGapSharingConfig
                                                                                                          OPTIONAL,
                                                                                                                     -- Need M
    ] ]
    interFrequencyConfig-NoGap-r16
                                       ENUMERATED {true}
                                                                                                          OPTIONAL
                                                                                                                      -- Need R
    ]]
MeasObjectToRemoveList ::=
                                       SEQUENCE (SIZE (1..maxNrofObjectId)) OF MeasObjectId
MeasIdToRemoveList ::=
                                       SEQUENCE (SIZE (1..maxNrofMeasId)) OF MeasId
ReportConfigToRemoveList ::=
                                       SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigId
-- TAG-MEASCONFIG-STOP
-- ASN1STOP
```

MeasConfig field descriptions

interFrequencyConfig-NoGap-r16

If the field is set to true, UE is configured to perform SSB based inter-frequency measurement without measurement gaps when the inter-frequency SSB is completely contained in the active DL BWP of the UE, as specified in TS 38.133 [14], clause 9.3. Otherwise, the SSB based inter-frequency measurement is performed within measurement gaps. In NR-DC, the field can only be configured in the *measConfig* associated with MCG, and when configured, it applies to all the inter-frequency measurements configured by MN and SN.

measGapConfig

Used to setup and release measurement gaps in NR.

measIdToAddModList

List of measurement identities to add and/or modify.

measIdToRemoveList

List of measurement identities to remove.

measObjectToAddModList

List of measurement objects to add and/or modify.

measObiectToRemoveList

List of measurement objects to remove.

reportConfigToAddModList

List of measurement reporting configurations to add and/or modify.

reportConfigToRemoveList

List of measurement reporting configurations to remove.

s-MeasureConfig

Threshold for NR SpCell RSRP measurement controlling when the UE is required to perform measurements on non-serving cells. Choice of *ssb-RSRP* corresponds to cell RSRP based on SS/PBCH block and choice of *csi-RSRP* corresponds to cell RSRP of CSI-RS.

measGapSharingConfig

Specifies the measurement gap sharing scheme and controls setup/ release of measurement gap sharing.

MeasGapConfig

The IE *MeasGapConfig* specifies the measurement gap configuration and controls setup/release of measurement gaps.

MeasGapConfig information element

```
-- ASN1START
-- TAG-MEASGAPCONFIG-START
MeasGapConfig ::=
                                       SEOUENCE {
                                           SetupRelease { GapConfig }
    gapFR2
                                                                                                                          OPTIONAL, -- Need M
    . . . ,
    1 1
    gapFR1
                                           SetupRelease { GapConfig }
                                                                                                                          OPTIONAL, -- Need M
                                                                                                                                       -- Need M
                                           SetupRelease { GapConfig }
                                                                                                                          OPTIONAL
    gapUE
    ]],
    gapToAddModList-r17 SEQUENCE (SIZE (1..maxNrofGapId-r17)) OF GapConfig-r17 gapToReleaseList-r17 SEQUENCE (SIZE (1..maxNrofGapId-r17)) OF MeasGapId-r17
                                                                                                                      OPTIONAL, -- Need N
                                                                                                                      OPTIONAL, -- Need N
    posMeasGapPreConfigToAddModList-r17
                                                PosMeasGapPreConfigToAddModList-r17
                                                                                                                          OPTIONAL, -- Need N
    posMeasGapPreConfigToReleaseList-r17
                                                PosMeasGapPreConfigToReleaseList-r17
                                                                                                                          OPTIONAL -- Need N
```

```
]]
GapConfig ::=
                                    SEQUENCE {
    qapOffset
                                       INTEGER (0..159),
   mql
                                       ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6},
                                       ENUMERATED {ms20, ms40, ms80, ms160},
    mgrp
                                       ENUMERATED {ms0, ms0dot25, ms0dot5},
    mgta
    . . . .
    ] ]
    refServCellIndicator
                                       ENUMERATED {pCell, pSCell, mcg-FR2}
                                                                                                            OPTIONAL -- Cond NEDCorNRDC
    11,
    Π
    refFR2ServCellAsyncCA-r16
                                       ServCellIndex
                                                                                                                       -- Cond AsyncCA
                                                                                                            OPTIONAL.
   mgl-r16
                                       ENUMERATED {ms10, ms20}
                                                                                                            OPTIONAL
                                                                                                                       -- Cond PRS
    ]]
GapConfig-r17 ::=
                                    SEQUENCE {
   measGapId-r17
                                       MeasGapId-r17,
    gapType-r17
                                       ENUMERATED {perUE, perFR1, perFR2},
    gapOffset-r17
                                       INTEGER (0..159),
   mal-r17
                                       ENUMERATED {ms1, ms1dot5, ms2, ms3, ms3dot5, ms4, ms5, ms5dot5, ms6, ms10, ms20},
    mgrp-r17
                                       ENUMERATED {ms20, ms40, ms80, ms160},
    mqta-r17
                                        ENUMERATED {ms0, ms0dot25, ms0dot5, ms0dot75},
    refServCellIndicator-r17
                                       ENUMERATED {pCell, pSCell, mcg-FR2}
                                                                                                                      -- Cond NEDCorNRDC
                                                                                                            OPTIONAL,
    refFR2-ServCellAsyncCA-r17
                                       ServCellIndex
                                                                                                            OPTIONAL,
                                                                                                                       -- Cond AsyncCA
                                       ENUMERATED {true}
                                                                                                                      -- Need R
   preConfigInd-r17
                                                                                                            OPTIONAL,
                                       ENUMERATED {true}
                                                                                                            OPTIONAL, -- Need R
   ncsqInd-r17
    gapAssociationPRS-r17
                                       ENUMERATED {true}
                                                                                                            OPTIONAL, -- Need R
                                       MeasGapSharingScheme
                                                                                                            OPTIONAL, -- Need R
    gapSharing-r17
    gapPriority-r17
                                       GapPriority-r17
                                                                                                            OPTIONAL, -- Need R
PosMeasGapPreConfigToAddModList-r17 ::= SEQUENCE (SIZE (1..maxNrofPreConfigPosGapId-r17)) OF PosGapConfig-r17
PosMeasGapPreConfigToReleaseList-r17 ::= SEOUENCE (SIZE (1..maxNrofPreConfigPosGapId-r17)) OF MeasPosPreConfigGapId-r17
PosGapConfig-r17 ::=
                                    SEQUENCE {
   measPosPreConfigGapId-r17
                                       MeasPosPreConfigGapId-r17,
    qapOffset-r17
                                       INTEGER (0..159),
    mgl-r17
                                       ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6, ms10, ms20},
   marp-r17
                                       ENUMERATED {ms20, ms40, ms80, ms160},
                                       ENUMERATED {ms0, ms0dot25, ms0dot5},
   mgta-r17
    gapType-r17
                                       ENUMERATED {perUE, perFR1, perFR2},
MeasPosPreConfigGapId-r17 ::= INTEGER (1..maxNrofPreConfigPosGapId-r17)
-- TAG-MEASGAPCONFIG-STOP
-- ASN1STOP
```

MeasGapConfig field descriptions

gapAssociationPRS

Indicates that PRS measurement is associated with this measurement gap. The network only includes this field for one per UE gap. If concurrent gap (i.e. one of the gap combination as defined in Table 9.1.8-1 in TS 38.133 [14]) is configured and no gap is configured with this field, the PRS measurement is associated with the gap configured via *gapUE*, if available.

gapFR1

Indicates measurement gap configuration that applies to FR1 only. In (NG)EN-DC, *gapFR1* cannot be set up by NR RRC (i.e. only LTE RRC can configure FR1 measurement gap). In NE-DC, *gapFR1* can only be set up by NR RRC (i.e. LTE RRC cannot configure FR1 gap). In NR-DC, *gapFR1* can only be set up in the *measConfig* associated with MCG. *gapFR1* can not be configured together with *gapUE*. The applicability of the FR1 measurement gap is according to Table 9.1.2-2 and Table 9.1.2-3 in TS 38.133 [14].

gapFR2

Indicates measurement gap configuration applies to FR2 only. In (NG)EN-DC or NE-DC, *gapFR2* can only be set up by NR RRC (i.e. LTE RRC cannot configure FR2 gap). In NR-DC, *gapFR2* can only be set up in the *measConfig* associated with MCG. *gapFR2* cannot be configured together with *gapUE*. The applicability of the FR2 measurement gap is according to Table 9.1.2-2 and Table 9.1.2-3 in TS 38.133 [14].

gapOffset

Value *gapOffset* is the gap offset of the gap pattern with MGRP indicated in the field *mgrp*. The value range is from 0 to *mgrp*-1. If *ncsgInd-r17* is present, this offset value refers to the starting point of VIL1 (the visible interruption length before the ML).

gapPriority

Indicates the priority of this measurement gap (see TS 38.133 [14], clause 9.1.8.3). Value 1 indicates highest priority, value 2 indicates second level priority, and so on.

gapSharing

Indicates the measurement gap sharing scheme that applies to this *GapConfig*. For applicability of the different gap sharing schemes, see TS 38.133 [14]. Value *scheme00* corresponds to scheme "00", value *scheme01* corresponds to scheme "01", and so on.

gapToAddModList

A list of of measurement gap configuration to be added or modified. If more than one measurement gap is configured (i.e. concurrent measurement gap as specified in TS 38.133[14], clause 9.1.8), the maximum number of configured measurement gap is limited by the gap combinations defined in Table 9.1.8-1 in TS 38.133 [14]. The network configures at most one NCSG or pre-configured measurement gap for a given gap type. In this version of the specification, the network configures this field only in NR standalone. This field is used only for a UE that supports pre-configured measurement gap, concurrent measurement gap, or NCSG. In this version of the specification, the network does not configure concurrent measurement gap together with MUSIM gap or preconfigured measurement gap for positioning.

gapToReleaseList

A list of measurement gap configuration to be released.

gapType

Indicates the type of this measurement gap. Value *perUE* indicates that it is a per UE measurement gap, value *perFR1* indicates that it is an FR1 measurement gap, and value *perFR2* indicates that it is an FR2 measurement gap.

gapUE

Indicates measurement gap configuration that applies to all frequencies (FR1 and FR2). In (NG)EN-DC, *gapUE* cannot be set up by NR RRC (i.e. only LTE RRC can configure per UE measurement gap). In NE-DC, *gapUE* can only be set up by NR RRC (i.e. LTE RRC cannot configure per UE gap). In NR-DC, *gapUE* can only be set up in the *measConfig* associated with MCG. If *gapUE* is configured, then neither *gapFR1* nor *gapFR2* can be configured. The applicability of the per UE measurement gap is according to Table 9.1.2-2 and Table 9.1.2-3 in TS 38.133 [14].

measGapId

The ID of this measurement gap configuration.

mg

Value mgl is the measurement gap length in ms of the measurement gap. If ncsgInd-r17 is not present, the measurement gap length is according to in Table 9.1.2-1 in TS 38.133 [14]. If ncsgInd-r17 is present, this field indicates the measurement length (ML) in NCSG pattern and is configured according to Table 9.1.9.3-1 in TS 38.133 [14]. Value ms1dot5 corresponds to 1.5 ms, ms3 corresponds to 3 ms and so on. If mgl-r16 is present, UE shall ignore the mgl (without suffix). Value ms1, ms2, and ms5 can only be configured if ncsgInd is present.

mgrp

If nosglnd-r17 is not present, the mgrp field indicates the measurement gap repetition period in (ms) of the measurement gap according to Table 9.1.2-1 in TS 38.133 [14]. If ncsglnd-r17 is present, the mgrp field indicates the Visible Interruption Repetition Period (VIRP) of NCSG pattern and is configured according to Table 9.1.9.3-1 in TS 38.133 [14].

mgta

Value *mgta* is the measurement gap timing advance in ms. The applicability of the measurement gap timing advance is according to clause 9.1.2 of TS 38.133 [14], or according to clause 9.1.9 of TS 38.133 [14] if *ncsgInd* is present. Value *ms0* corresponds to 0 ms, *ms0dot25* corresponds to 0.25 ms, *ms0dot5* corresponds to 0.5 ms and *ms0dot75* corresponds to 0.75 ms. For FR2, the network only configures 0 ms and 0.25 ms if *ncsgInd* is not present. If *ncsgInd* is present, the network only configures 0 ms for per-UE NCSG and FR1 NCSG and only configures 0 ms or 0.75 ms for FR2 NCSG. Value *ms0dot75* can only be configured if *ncsgInd* is present.

ncsglnd

Indicates that the measurement gap is a NCSG as specified in 38.133 [14].

posMeasGapPreConfigToAddModList

List of preconfigured measurement gap for positioning to add and/or modify. All the gaps configured are associated with the measurement of PRS for RSTD, UE-RxTx Time Difference, PRS-RSRP and PRS-RSRP as defined in TS 38.215 [9]. In this version of the specification, the network does not configure preconfigured measurement gap for positioning together with concurrent measurement gap or MUSIM gap.

posMeasGapPreConfigToReleaseList

List of preconfigured measurement gap for positioning to release.

preConfigInd

Indicates whether the measurement gap is a pre-configured measurement gap.

refFR2ServCellAsyncCA

Indicates the FR2 serving cell identifier whose SFN and subframe is used for FR2 gap calculation for this gap pattern with asynchronous CA involving FR2 carrier(s).

refServCellIndicator

Indicates the serving cell whose SFN and subframe are used for gap calculation for this gap pattern. Value pCell corresponds to the PCell, pSCell corresponds to the PSCell, and mcg-FR2 corresponds to a serving cell on FR2 frequency in MCG.

Conditional Presence	Explanation
AsyncCA	This field is mandatory present when configuring FR2 gap pattern to UE in:
	- (NG)EN-DC or NR SA with asynchronous CA involving FR2 carrier(s);
	- NE-DC or NR-DC with asynchronous CA involving FR2 carrier(s), if the field refServCellIndicator is set to mcg-FR2.
	In case the gap pattern to UE in NE-DC and NR-DC is already configured and the serving cell used for the gap calculation corresponds to a serving cell on FR2 frequency in MCG, then the field is optionally present, need M. Otherwise, it is absent, Need R.
NEDCorNRDC	This field is mandatory present when configuring gap pattern to UE in NE-DC or NR-DC. In case the gap pattern to UE in
	NE-DC and NR-DC is already configured, then the field is absent, need M. Otherwise, it is absent.
PRS	This field is optionally present, Need R, when configuring gap pattern to UE for measurements of DL-PRS configured via
	LPP (TS 37.355 [49]). Otherwise, it is absent.

– MeasGapId

The IE MeasGapId used to identify a per UE or per FR measurement gap configuration.

MeasGapId information element

```
-- TAG-MEASGAPID-START

MeasGapId-r17 ::= INTEGER (1..maxNrofGapId-r17)

-- TAG-MEASGAPID-STOP

-- ASN1STOP
```

MeasGapSharingConfig

The IE MeasGapSharingConfig specifies the measurement gap sharing scheme and controls setup/ release of measurement gap sharing.

MeasGapSharingConfig information element

```
-- ASN1START
-- TAG-MEASGAPSHARINGCONFIG-START
MeasGapSharingConfig ::=
    gapSharingFR2
                                   SetupRelease { MeasGapSharingScheme }
                                                                                OPTIONAL.
                                                                                          -- Need M
    . . . ,
    [ [
    gapSharingFR1
                                    SetupRelease { MeasGapSharingScheme }
                                                                                OPTIONAL, --Need M
                                    SetupRelease { MeasGapSharingScheme }
                                                                                OPTIONAL
    gapSharingUE
                                                                                          --Need M
    11
MeasGapSharingScheme::=
                                ENUMERATED {scheme00, scheme01, scheme10, scheme11}
-- TAG-MEASGAPSHARINGCONFIG-STOP
-- ASN1STOP
```

MeasGapSharingConfig field descriptions

gapSharingFR1

Indicates the measurement gap sharing scheme that applies to the gap set via *gapFR1*. In (NG)EN-DC, *gapSharingFR1* cannot be set up by NR RRC (i.e. only LTE RRC can configure FR1 gap sharing). In NE-DC, *gapSharingFR1* can only be set up by NR RRC (i.e. LTE RRC cannot configure FR1 gap sharing). In NR-DC, *gapSharingFR1* can only be set up in the *measConfig* associated with MCG. *gapSharingFR1* can not be configured together with *gapSharingUE*. For the applicability of the different gap sharing schemes, see TS 38.133 [14]. Value *scheme00* corresponds to scheme "00", value *scheme01* corresponds to scheme "01", and so on.

gapSharingFR2

Indicates the measurement gap sharing scheme that applies to the gap set via *gapFR2*. In (NG)EN-DC or NE-DC, *gapSharingFR2* can only be set up by NR RRC (i.e. LTE RRC cannot configure FR2 gap sharing). In NR-DC, *gapSharingFR2* can only be set up by MCG in the *measConfig* associated with MCG. *gapSharingFR2* cannot be configured together with *gapSharingUE*. For applicability of the different gap sharing schemes, see TS 38.133 [14]. Value *scheme00* corresponds to scheme "00", value *scheme01* corresponds to scheme "01", and so on.

gapSharingUE

Indicates the measurement gap sharing scheme that applies to the gap set via *gapUE*. In (NG)EN-DC, *gapSharingUE* cannot be set up by NR RRC (i.e. only LTE RRC can configure per UE gap sharing). In NE-DC, *gapSharingUE* can only be set up by NR RRC (i.e. LTE RRC cannot configure per UE gap sharing). In NR-DC, *gapSharingUE* can only be set up in the *measConfig* associated with MCG. If *gapSharingUE* is configured, then neither *gapSharingFR1* nor *gapSharingFR2* can be configured. For the applicability of the different gap sharing schemes, see TS 38.133 [14]. Value *scheme00* corresponds to scheme "00", value *scheme01* corresponds to scheme "01", and so on.

– Measid

The IE MeasId is used to identify a measurement configuration, i.e., linking of a measurement object and a reporting configuration.

MeasId information element

```
-- ASN1START
-- TAG-MEASID-START

MeasId ::= INTEGER (1..maxNrofMeasId)
-- TAG-MEASID-STOP
-- ASN1STOP
```

MeasIdleConfig

The IE *MeasIdleConfig* is used to convey information to UE about measurements requested to be done while in RRC IDLE or RRC INACTIVE.

MeasIdleConfig information element

```
-- ASN1START
-- TAG-MEASIDLECONFIG-START
MeasIdleConfigSIB-r16 ::= SEQUENCE {
    measIdleCarrierListNR-r16
                                    SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierNR-r16
                                                                                                          OPTIONAL,
                                                                                                                        -- Need S
   measIdleCarrierListEUTRA-r16
                                   SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierEUTRA-r16
                                                                                                          OPTIONAL,
                                                                                                                        -- Need S
MeasIdleConfigDedicated-r16 ::= SEQUENCE {
    measIdleCarrierListNR-r16
                                   SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierNR-r16
                                                                                                          OPTIONAL,
                                                                                                                        -- Need N
   measIdleCarrierListEUTRA-r16 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierEUTRA-r16
                                                                                                          OPTIONAL,
                                                                                                                        -- Need N
   measIdleDuration-r16
                                   ENUMERATED { sec10, sec30, sec60, sec120, sec180, sec240, sec300, spare },
                                   ValidityAreaList-r16
    validityAreaList-r16
                                                                                                          OPTIONAL,
                                                                                                                        -- Need N
ValidityAreaList-r16 ::= SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF ValidityArea-r16
ValidityArea-r16 ::=
                                SEQUENCE {
    carrierFreg-r16
                                    ARFCN-ValueNR,
    validityCellList-r16
                                    ValidityCellList
                                                                                                         OPTIONAL -- Need N
ValidityCellList ::= SEQUENCE (SIZE (1.. maxCellMeasIdle-r16)) OF PCI-Range
MeasIdleCarrierNR-r16 ::=
                                SEQUENCE {
    carrierFreg-r16
                                    ARFCN-ValueNR,
    ssbSubcarrierSpacing-r16
                                    SubcarrierSpacing,
    frequencyBandList
                                    MultiFrequencyBandListNR
                                                                                                         OPTIONAL, -- Need R
```

```
measCellListNR-r16
                                    CellListNR-r16
    reportOuantities-r16
                                    ENUMERATED {rsrp, rsrq, both},
    qualityThreshold-r16
                                    SEOUENCE {
       idleRSRP-Threshold-NR-r16
                                         RSRP-Range
       idleRSRO-Threshold-NR-r16
                                         RSRO-Range
    ssb-MeasConfig-r16
                                    SEOUENCE {
       nrofSS-BlocksToAverage-r16
                                            INTEGER (2..maxNrofSS-BlocksToAverage)
       absThreshSS-BlocksConsolidation-r16 ThresholdNR
       smtc-r16
                                            SSB-MTC
       ssb-ToMeasure-r16
                                            SSB-ToMeasure
       deriveSSB-IndexFromCell-r16
                                           BOOLEAN,
       ss-RSSI-Measurement-r16
                                           SS-RSSI-Measurement
    beamMeasConfigIdle-r16
                                    BeamMeasConfigIdle-NR-r16
                                 SEOUENCE {
MeasIdleCarrierEUTRA-r16 ::=
    carrierFreqEUTRA-r16
                                    ARFCN-ValueEUTRA,
    allowedMeasBandwidth-r16
                                    EUTRA-AllowedMeasBandwidth,
    measCellListEUTRA-r16
                                    CellListEUTRA-r16
                                    ENUMERATED {rsrp, rsrq, both},
    reportQuantitiesEUTRA-r16
    qualityThresholdEUTRA-r16
                                    SEQUENCE {
                                        RSRP-RangeEUTRA
       idleRSRP-Threshold-EUTRA-r16
       idleRSRO-Threshold-EUTRA-r16
                                         RSRQ-RangeEUTRA-r16
CellListNR-r16 ::=
                         SEQUENCE (SIZE (1..maxCellMeasIdle-r16)) OF PCI-Range
CellListEUTRA-r16 ::=
                         SEQUENCE (SIZE (1..maxCellMeasIdle-r16)) OF EUTRA-PhysCellIdRange
BeamMeasConfigIdle-NR-r16 ::= SEOUENCE {
    reportQuantityRS-Indexes-r16
                                    ENUMERATED {rsrp, rsrq, both},
    maxNrofRS-IndexesToReport-r16
                                    INTEGER (1.. maxNrofIndexesToReport),
    includeBeamMeasurements-r16
                                    BOOLEAN
RSRQ-RangeEUTRA-r16 ::= INTEGER (-30..46)
-- TAG-MEASIDLECONFIG-STOP
-- ASN1STOP
```

```
OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need S

OPTIONAL, -- Need S

OPTIONAL, -- Need S

OPTIONAL, -- Need S

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R
```

MeasIdleConfig field descriptions

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absThreshSS-BlocksConsolidation

Threshold for consolidation of L1 measurements per RS index.

beamMeasConfigIdle

Indicates the beam level measurement configuration.

carrierFreq

Indicates the NR carrier frequency to be used for measurements during RRC_IDLE or RRC_INACTIVE.

carrierFreqEUTRA

Indicates the E-UTRA carrier frequency to be used for measurements during RRC_IDLE or RRC_INACTIVE.

deriveSSB-IndexFromCell

This field indicates whether the UE may use the timing of any detected cell on that frequency to derive the SSB index of all neighbour cells on that frequency. If this field is set to true, the UE assumes SFN and frame boundary alignment across cells on the neighbor frequency as specified in TS 38.133 [14].

frequencyBandList

Indicates the list of frequency bands for which the NR idle/inactive measurement parameters apply. The UE shall select the first listed band which it supports in the frequencyBandList field to represent the NR neighbour carrier frequency.

includeBeamMeasurements

Indicates whether or not the UE shall include beam measurements in the NR idle/inactive measurement results.

maxNrofRS-IndexesToReport

Max number of beam indices to include in the idle/inactive measurement result.

measCellListEUTRA

Indicates the list of E-UTRA cells which the UE is requested to measure and report for idle/inactive measurements.

measCellListNR

Indicates the list of NR cells which the UE is requested to measure and report for idle/inactive measurements.

measIdleCarrierListEUTRA

Indicates the E-UTRA carriers to be measured during RRC IDLE or RRC INACTIVE.

measIdleCarrierListNR

Indicates the NR carriers to be measured during RRC_IDLE or RRC_INACTIVE.

measIdleDuration

Indicates the duration for performing idle/inactive measurements while in RRC_IDLE or RRC_INACTIVE. Value sec10 correspond to 10 seconds, value sec30 to 30 seconds and so on.

nrofSS-BlocksToAverage

Number of SS blocks to average for cell measurement derivation.

qualityThreshold

Indicates the quality thresholds for reporting the measured cells for idle/inactive NR measurements.

qualityThresholdEUTRA

Indicates the quality thresholds for reporting the measured cells for idle/inactive E-UTRA measurements.

reportQuantities

Indicates which measurement quantities UE is requested to report in the idle/inactive measurement report.

reportQuantitiesEUTRA

Indicates which E-UTRA measurement quantities the UE is requested to report in the idle/inactive measurement report.

reportQuantityRS-Indexes

Indicates which measurement information per beam index the UE shall include in the NR idle/inactive measurement results.

smtc

Indicates the measurement timing configuration for inter-frequency measurement. If this field is absent in *VarMeasIdleConfig*, the UE assumes that SSB periodicity is 5 ms in this frequency.

ssbSubcarrierSpacing

Indicates subcarrier spacing of SSB.

Only the following values are applicable depending on the used frequency:

FR1: 15 or 30 kHz FR2-1: 120 or 240 kHz FR2-2: 120, 480, or 960 kHz

ssb-ToMeasure

The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]). When the field is absent in VarMeasIdleConfig, the UE measures on all SS-blocks.

ss-RSSI-Measurement

Indicates the SSB-based RSSI measurement configuration. If the field is absent in VarMeasIdleConfig, the UE behaviour is defined in TS 38.215 [89], clause 5.1.3.

validityAreaList

Indicates the list of frequencies and optionally, for each frequency, a list of cells within which the UE is required to perform measurements while in RRC_IDLE and RRC_INACTIVE.

MeasIdToAddModList

The IE MeasIdToAddModList concerns a list of measurement identities to add or modify, with for each entry the measId, the associated measObjectId and the associated reportConfigId.

MeasIdToAddModList information element

```
-- ASN1START
-- TAG-MEASIDTOADDMODLIST-START

MeasIdToAddModList ::= SEQUENCE (SIZE (1..maxNrofMeasId)) OF MeasIdToAddMod

MeasIdToAddMod ::= SEQUENCE {
    measId MeasId,
    measObjectId MeasObjectId,
    reportConfigId ReportConfigId
}

-- TAG-MEASIDTOADDMODLIST-STOP
-- ASN1STOP
```

MeasObjectCLI

The IE MeasObjectCLI specifies information applicable for SRS-RSRP measurements and/or CLI-RSSI measurements.

MeasObjectCLI information element

```
-- ASN1START
```

⁻⁻ TAG-MEASOBJECTCLI-START

```
MeasObjectCLI-r16 ::=
                                       SEQUENCE {
    cli-ResourceConfig-r16
                                          CLI-ResourceConfig-r16,
    . . .
CLI-ResourceConfig-r16 ::=
                                    SEQUENCE {
    srs-ResourceConfig-r16
                                        SetupRelease {
                                                       SRS-ResourceListConfigCLI-r16 }
                                                                                                        OPTIONAL,
                                                                                                                    -- Need M
    rssi-ResourceConfig-r16
                                        SetupRelease { RSSI-ResourceListConfigCLI-r16 }
                                                                                                        OPTIONAL
                                                                                                                    -- Need M
SRS-ResourceListConfigCLI-r16 ::=
                                    SEQUENCE (SIZE (1.. maxNrofCLI-SRS-Resources-r16)) OF SRS-ResourceConfigCLI-r16
RSSI-ResourceListConfigCLI-r16 ::= SEQUENCE (SIZE (1.. maxNrofCLI-RSSI-Resources-r16)) OF RSSI-ResourceConfigCLI-r16
SRS-ResourceConfigCLI-r16 ::=
                                    SEOUENCE {
    srs-Resource-r16
                                        SRS-Resource,
    srs-SCS-r16
                                        SubcarrierSpacing,
    refServCellIndex-r16
                                        ServCellIndex
                                                                                                        OPTIONAL, -- Need S
    refBWP-r16
                                        BWP-Id,
    . . .
RSSI-ResourceConfigCLI-r16 ::=
                                    SEQUENCE {
   rssi-ResourceId-r16
                                        RSSI-ResourceId-r16,
   rssi-SCS-r16
                                        SubcarrierSpacing,
    start.PRB-r16
                                        INTEGER (0..2169),
    nrofPRBs-r16
                                        INTEGER (4..maxNrofPhysicalResourceBlocksPlus1),
    startPosition-r16
                                        INTEGER (0..13),
    nrofSymbols-r16
                                        INTEGER (1..14),
    rssi-PeriodicityAndOffset-r16
                                        RSSI-PeriodicityAndOffset-r16,
    refServCellIndex-r16
                                        ServCellIndex
                                                                                                        OPTIONAL,
                                                                                                                  -- Need S
RSSI-ResourceId-r16 ::=
                                    INTEGER (0.. maxNrofCLI-RSSI-Resources-1-r16)
RSSI-PeriodicityAndOffset-r16 ::= CHOICE {
    s110
                                        INTEGER(0..9),
    s120
                                        INTEGER(0..19),
    s140
                                        INTEGER(0..39),
    s180
                                        INTEGER(0..79),
    s1160
                                        INTEGER(0..159),
    s1320
                                        INTEGER(0..319),
    s1640
                                        INTEGER(0..639),
    . . .
-- TAG-MEASOBJECTCLI-STOP
-- ASN1STOP
```

CLI-ResourceConfig field descriptions

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srs-ResourceConfig

SRS resources to be used for CLI measurements.

rssi-ResourceConfig

CLI-RSSI resources to be used for CLI measurements.

MeasObjectCLI field descriptions

cli-ResourceConfig

SRS and/or CLI-RSSI resource configuration for CLI measurement.

SRS-ResourceConfigCLI field descriptions

refBWP

DL BWP id that is used to derive the reference point of the SRS resource (see TS 38.211[16], clause 6.4.1.4.3)

refServCellIndex

The index of the reference serving cell that the refBWP belongs to. If this field is absent, the reference serving cell is PCell.

srs-SCS

Subcarrier spacing for SRS.

Only the following values are applicable depending on the used frequency:

FR1: 15, 30, or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

RSSI-ResourceConfigCLI field descriptions

nrofPRBs

Allowed size of the measurement BW. Only multiples of 4 are allowed. The smallest configurable number is the minimum of 4 and the width of the active DL BWP. If the configured value is larger than the width of the active DL BWP, the UE shall assume that the actual CLI-RSSI resource bandwidth is within the active DL BWP.

nrofSymbols

Within a slot that is configured for CLI-RSSI measurement (see slotConfiguration), the UE measures the RSSI from *startPosition* to *startPosition* + *nrofSymbols* - 1. The configured CLI-RSSI resource does not exceed the slot boundary of the reference SCS. If the SCS of configured DL BWP(s) is larger than the reference SCS, network configures *startPosition* and *nrofSymbols* such that the configured CLI-RSSI resource not to exceed the slot boundary corresponding to the configured BWP SCS. If the reference SCS is larger than SCS of configured DL BWP(s), network ensures *startPosition* and *nrofSymbols* are integer multiple of reference SCS divided by configured BWP SCS.

refServCellIndex

The index of the reference serving cell. Frequency reference point of the RSSI resource is subcarrier 0 of CRB0 of the reference serving cell. If this field is absent, the reference serving cell is PCell.

rssi-PeriodicityAndOffset

Periodicity and slot offset for this CLI-RSSI resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots.

rssi-SCS

Reference subcarrier spacing for CLI-RSSI measurement.

Only the following values are applicable depending on the used frequency:

FR1: 15, 30, or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

UE performs CLI-RSSI measurement with the SCS of the active bandwidth part within the configured CLI-RSSI resource in the active BWP regardless of the reference SCS of the measurement resource.

startPosition

OFDM symbol location of the CLI-RSSI resource within a slot.

startPRB

Starting PRB index of the measurement bandwidth. For the case where the reference subcarrier spacing is smaller than subcarrier spacing of active DL BWP(s), network configures startPRB and nrofPRBs are as a multiple of active BW SCS divided by reference SCS.

– MeasObjectEUTRA

The IE MeasObjectEUTRA specifies information applicable for E-UTRA cells.

MeasObjectEUTRA information element

```
-- ASN1START
-- TAG-MEASOBJECTEUTRA-START
MeasObjectEUTRA::=
                                           SEOUENCE {
    carrierFreq
                                               ARFCN-ValueEUTRA,
    allowedMeasBandwidth
                                               EUTRA-AllowedMeasBandwidth,
    cellsToRemoveListEUTRAN
                                               EUTRA-CellIndexList
                                                                                                          OPTIONAL,
                                                                                                                       -- Need N
                                               SEQUENCE (SIZE (1..maxCellMeasEUTRA)) OF EUTRA-Cell
                                                                                                          OPTIONAL,
                                                                                                                      -- Need N
    cellsToAddModListEUTRAN
                                                                                                                       -- Need N
    excludedCellsToRemoveListEUTRAN
                                               EUTRA-CellIndexList
                                                                                                          OPTIONAL,
    excludedCellsToAddModListEUTRAN
                                               SEQUENCE (SIZE (1..maxCellMeasEUTRA)) OF EUTRA-ExcludedCell OPTIONAL, -- Need N
```

-- Need R

-- Need R

```
eutra-PresenceAntennaPort1
                                                EUTRA-PresenceAntennaPort1,
    eutra-O-OffsetRange
                                                EUTRA-O-OffsetRange
                                                                                                             OPTIONAL,
    widebandRSRO-Meas
                                                BOOLEAN,
    ] ]
    associatedMeasGap-r17
                                                MeasGapId-r17
                                                                                                             OPTIONAL
    ]]
EUTRA-CellIndexList ::=
                                            SEQUENCE (SIZE (1..maxCellMeasEUTRA)) OF EUTRA-CellIndex
EUTRA-CellIndex ::=
                                            INTEGER (1..maxCellMeasEUTRA)
EUTRA-Cell ::=
                                            SEOUENCE {
    cellIndexEUTRA
                                                EUTRA-CellIndex,
                                                EUTRA-PhysCellId,
    physCellId
    cellIndividualOffset
                                                EUTRA-Q-OffsetRange
EUTRA-ExcludedCell ::=
                                            SEQUENCE {
    cellIndexEUTRA
                                                EUTRA-CellIndex,
                                                EUTRA-PhysCellIdRange
    physCellIdRange
-- TAG-MEASOBJECTEUTRA-STOP
```

EUTRAN-ExcludedCell field descriptions

cellIndexEUTRA

-- ASN1STOP

Entry index in the cell list.

physicalCellIdRange

Physical cell identity or a range of physical cell identities.

EUTRAN-Cell field descriptions

physicalCellId

Physical cell identity of a cell in the cell list.

cellIndividualOffset

Cell individual offset applicable to a specific cell. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.

MeasObjectEUTRA field descriptions

allowedMeasBandwidth

The maximum allowed measurement bandwidth on a carrier frequency as defined by the parameter Transmission Bandwidth Configuration "N_{RB}" TS 36.104 [33].

associatedMeasGap

Indicates the associated measurement gap for measuring this EUTRA frequency. If this field is absent, the associated measurement gap is the gap configured via *gapFR1* or *gapUE*.

carrierFreq

Identifies E-UTRA carrier frequency for which this configuration is valid. Network does not configure more than one *MeasObjectEUTRA* for the same physical frequency, regardless of the E-ARFCN used to indicate this.

cellsToAddModListEUTRAN

List of cells to add/ modify in the cell list.

cellsToRemoveListEUTRAN

List of cells to remove from the cell list.

eutra-PresenceAntennaPort1

When set to true, the UE may assume that at least two cell-specific antenna ports are used in all neighbouring cells.

eutra-Q-OffsetRange

Used to indicate a cell, or frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value is in dB. Value dB-24 corresponds to -24 dB, value dB-22 corresponds to -22 dB and so on.

excludedCellsToAddModListEUTRAN

List of cells to add/ modify in the exclude-list of cells.

excludedCellsToRemoveListEUTRAN

List of cells to remove from the exclude-list of cells.

widebandRSRQ-Meas

If set to *true*, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [40]. The network may set the field to *true* if the measurement bandwidth indicated by *allowedMeasBandwidth* is 50 resource blocks or larger; otherwise the network sets this field to *false*.

– MeasObjectId

The IE *MeasObjectId* used to identify a measurement object configuration.

MeasObjectId information element

-- ASN1START

-- TAG-MEASOBJECTID-START

MeasObjectId ::=

INTEGER (1..maxNrofObjectId)

- -- TAG-MEASOBJECTID-STOP
- -- ASN1STOP

· MeasObjectNR

The IE MeasObjectNR specifies information applicable for SS/PBCH block(s) intra/inter-frequency measurements and/or CSI-RS intra/inter-frequency measurements.

MeasObjectNR information element

```
-- ASN1START
-- TAG-MEASOBJECTNR-START
                                    SEOUENCE {
MeasObjectNR ::=
    ssbFrequency
                                        ARFCN-ValueNR
                                                                                                                    -- Cond SSBorAssociatedSSB
                                                                                                         OPTIONAL,
                                        SubcarrierSpacing
                                                                                                                     -- Cond SSBorAssociatedSSB
    ssbSubcarrierSpacing
                                                                                                         OPTIONAL,
                                                                                                         OPTIONAL, -- Cond SSBorAssociatedSSB
    smtc1
                                        SSB-MTC
    smtc2
                                        SSB-MTC2
                                                                                                         OPTIONAL, -- Cond IntraFreqConnected
                                                                                                         OPTIONAL, -- Cond CSI-RS
    refFreqCSI-RS
                                        ARFCN-ValueNR
                                        ReferenceSignalConfig,
    referenceSignalConfig
    absThreshSS-BlocksConsolidation
                                        ThresholdNR
                                                                                                                    -- Need R
                                                                                                         OPTIONAL,
    absThreshCSI-RS-Consolidation
                                        ThresholdNR
                                                                                                         OPTIONAL, -- Need R
                                        INTEGER (2..maxNrofSS-BlocksToAverage)
                                                                                                                    -- Need R
    nrofSS-BlocksToAverage
                                                                                                         OPTIONAL,
                                        INTEGER (2..maxNrofCSI-RS-ResourcesToAverage)
                                                                                                         OPTIONAL,
                                                                                                                   -- Need R
    nrofCSI-RS-ResourcesToAverage
    quantityConfiqIndex
                                        INTEGER (1..maxNrofOuantityConfig),
    offsetMO
                                        Q-OffsetRangeList,
    cellsToRemoveList
                                        PCI-List
                                                                                                         OPTIONAL,
                                                                                                                    -- Need N
    cellsToAddModList
                                        CellsToAddModList
                                                                                                         OPTIONAL, -- Need N
    excludedCellsToRemoveList
                                        PCI-RangeIndexList
                                                                                                         OPTIONAL, -- Need N
    excludedCellsToAddModList
                                        SEQUENCE (SIZE (1..maxNrofPCI-Ranges)) OF PCI-RangeElement
                                                                                                         OPTIONAL, -- Need N
    allowedCellsToRemoveList
                                        PCI-RangeIndexList
                                                                                                         OPTIONAL, -- Need N
    allowedCellsToAddModList
                                        SEQUENCE (SIZE (1..maxNrofPCI-Ranges)) OF PCI-RangeElement
                                                                                                         OPTIONAL, -- Need N
    [ [
    fregBandIndicatorNR
                                        FreqBandIndicatorNR
                                                                                                         OPTIONAL,
                                                                                                                     -- Need R
                                        ENUMERATED {sf160, sf256, sf320, sf512, sf640, sf1024, sf1280}
    measCycleSCell
                                                                                                        OPTIONAL
                                                                                                                     -- Need R
    ]],
    ] ]
    smtc3list-r16
                                        SSB-MTC3List-r16
                                                                                                         OPTIONAL,
                                                                                                                     -- Need R
    rmtc-Config-r16
                                        SetupRelease {RMTC-Config-r16}
                                                                                                         OPTIONAL,
                                                                                                                     -- Need M
    t312-r16
                                        SetupRelease { T312-r16 }
                                                                                                         OPTIONAL
                                                                                                                    -- Need M
    11,
    ГΓ
    associatedMeasGapSSB-r17
                                        MeasGapId-r17
                                                                                                         OPTIONAL,
                                                                                                                     -- Need R
    associatedMeasGapCSIRS-r17
                                        MeasGapId-r17
                                                                                                         OPTIONAL,
                                                                                                                     -- Need R
    smtc4list-r17
                                        SSB-MTC4List-r17
                                                                                                         OPTIONAL,
                                                                                                                      -- Need R
    measCyclePSCell-r17
                                        ENUMERATED {ms160, ms256, ms320, ms512, ms640, ms1024, ms1280, spare1}
                                                                                                         OPTIONAL,
                                                                                                                     -- Cond SCG
    cellsToAddModListExt-v1710
                                        CellsToAddModListExt-v1710
                                                                                                                     -- Need N
                                                                                                         OPTIONAL
   11,
   11
   associatedMeasGapSSB2-v1720
                                        MeasGapId-r17
                                                                                                     OPTIONAL, -- Cond AssociatedGapSSB
                                                                                                     OPTIONAL -- Cond AssociatedGapCSIRS
   associatedMeasGapCSIRS2-v1720
                                        MeasGapId-r17
   ]]
SSB-MTC3List-r16::=
                                    SEQUENCE (SIZE(1..4)) OF SSB-MTC3-r16
SSB-MTC4List-r17::=
                                    SEQUENCE (SIZE(1..3)) OF SSB-MTC4-r17
T312-r16 ::=
                                    ENUMERATED { ms0, ms50, ms100, ms200, ms300, ms400, ms500, ms1000}
```

```
ReferenceSignalConfig::=
                                     SEOUENCE {
    ssb-ConfigMobility
                                         SSB-ConfigMobility
                                                                                                          OPTIONAL.
                                                                                                                      -- Need M
    csi-rs-ResourceConfiqMobility
                                         SetupRelease { CSI-RS-ResourceConfigMobility }
                                                                                                          OPTIONAL
                                                                                                                       -- Need M
SSB-ConfigMobility::=
                                     SEOUENCE {
    ssb-ToMeasure
                                         SetupRelease { SSB-ToMeasure }
                                                                                                                       -- Need M
                                                                                                          OPTIONAL.
    deriveSSB-IndexFromCell
                                         BOOLEAN,
    ss-RSST-Measurement
                                         SS-RSSI-Measurement
                                                                                                          OPTIONAL.
                                                                                                                      -- Need M
    . . . ,
    ] ]
                                             SSB-PositionOCL-Relation-r16
    ssb-PositionOCL-Common-r16
                                                                                                          OPTIONAL,
                                                                                                                      -- Cond SharedSpectrum
    ssb-PositionOCL-CellsToAddModList-r16
                                            SSB-PositionOCL-CellsToAddModList-r16
                                                                                                                      -- Need N
                                                                                                          OPTIONAL,
    ssb-PositionOCL-CellsToRemoveList-r16
                                            PCI-List
                                                                                                          OPTIONAL
                                                                                                                      -- Need N
    ]],
    Π
    deriveSSB-IndexFromCellInter-r17
                                         ServCellIndex
                                                                                                          OPTIONAL,
                                                                                                                      -- Need R
    ssb-PositionOCL-Common-r17
                                         SSB-PositionOCL-Relation-r17
                                                                                                      OPTIONAL, -- Cond SharedSpectrum2
                                         SetupRelease {SSB-PositionOCL-CellList-r17}
    ssb-PositionOCL-Cells-r17
                                                                                                          OPTIONAL
                                                                                                                     -- Need M
    11,
    11
    cca-CellsToAddModList-r17
                                        PCI-List
                                                                                                          OPTIONAL,
                                                                                                                      -- Need N
    cca-CellsToRemoveList-r17
                                         PCT-List
                                                                                                          OPTIONAL
                                                                                                                      -- Need N
    11
O-OffsetRangeList ::=
                                     SEOUENCE {
    rsrpOffsetSSB
                                         O-OffsetRange
                                                                     DEFAULT dB0,
    rsrqOffsetSSB
                                        O-OffsetRange
                                                                     DEFAULT dB0,
    sinrOffsetSSB
                                        Q-OffsetRange
                                                                     DEFAULT dB0,
                                        O-OffsetRange
    rsrpOffsetCSI-RS
                                                                     DEFAULT dB0,
    rsrqOffsetCSI-RS
                                        Q-OffsetRange
                                                                     DEFAULT dB0,
    sinrOffsetCSI-RS
                                         Q-OffsetRange
                                                                     DEFAULT dB0
ThresholdNR ::=
                                     SEQUENCE {
    thresholdRSRP
                                         RSRP-Range
                                                                                                          OPTIONAL,
                                                                                                                      -- Need R
    thresholdRSRO
                                        RSRO-Range
                                                                                                                      -- Need R
                                                                                                          OPTIONAL,
    thresholdSINR
                                         SINR-Range
                                                                                                          OPTIONAL
                                                                                                                      -- Need R
CellsToAddModList ::=
                                     SEQUENCE (SIZE (1..maxNrofCellMeas)) OF CellsToAddMod
CellsToAddModListExt-v1710 ::=
                                     SEQUENCE (SIZE (1..maxNrofCellMeas)) OF CellsToAddModExt-v1710
CellsToAddMod ::=
                                     SEOUENCE {
    physCellId
                                         PhysCellId,
    cellIndividualOffset
                                        Q-OffsetRangeList
CellsToAddModExt-v1710 ::=
                                     SEOUENCE {
    ntn-PolarizationDL-r17
                                         ENUMERATED {rhcp,lhcp,linear}
                                                                                                          OPTIONAL, -- Need R
    ntn-PolarizationUL-r17
                                         ENUMERATED {rhcp,lhcp,linear}
                                                                                                          OPTIONAL -- Need R
```

```
RMTC-Config-r16 ::=
                                    SEOUENCE {
    rmtc-Periodicity-r16
                                        ENUMERATED {ms40, ms80, ms160, ms320, ms640},
    rmtc-SubframeOffset-r16
                                        INTEGER (0..639)
                                                                                                        OPTIONAL. -- Need M
    measDurationSymbols-r16
                                        ENUMERATED {sym1, sym14or12, sym28or24, sym42or36, sym70or60},
    rmtc-Frequency-r16
                                        ARFCN-ValueNR,
    ref-SCS-CP-r16
                                        ENUMERATED {kHz15, kHz30, kHz60-NCP, kHz60-ECP},
    rmtc-Bandwidth-r17
                                        ENUMERATED {mhz100, mhz400, mhz800, mhz1600, mhz2000}
                                                                                                        OPTIONAL, -- Need R
    measDurationSymbols-v1700
                                        ENUMERATED {sym140, sym560, sym1120}
                                                                                                        OPTIONAL, -- Need R
                                        ENUMERATED {kHz120, kHz480, kHz960}
    ref-SCS-CP-v1700
                                                                                                        OPTIONAL, -- Need R
    tci-StateInfo-r17
                                    SEOUENCE {
       tci-StateId-r17
                                        TCI-StateId,
       ref-ServCellId-r17
                                         ServCellIndex
                                                                                                        OPTIONAL -- Need R
    } OPTIONAL -- Need R
    ]],
    [ [
    ref-BWPId-r17
                                    BWP-Id
                                                                                                        OPTIONAL -- Need R
    11
SSB-PositionOCL-CellsToAddModList-r16 ::= SEQUENCE (SIZE (1..maxNrofCellMeas)) OF SSB-PositionQCL-CellsToAddMod-r16
SSB-PositionOCL-CellsToAddMod-r16 ::= SEQUENCE {
    physCellId-r16
                                          PhysCellId,
    ssb-PositionOCL-r16
                                          SSB-PositionOCL-Relation-r16
SSB-PositionQCL-CellList-r17 ::= SEQUENCE (SIZE (1..maxNrofCellMeas)) OF SSB-PositionQCL-Cell-r17
SSB-PositionQCL-Cell-r17
                                ::= SEQUENCE {
    physCellId-r17
                                          PhysCellId,
                                          SSB-PositionOCL-Relation-r17
    ssb-PositionOCL-r17
-- TAG-MEASOBJECTNR-STOP
-- ASN1STOP
```

CellsToAddMod field descriptions

cellIndividualOffset

Cell individual offsets applicable to a specific cell.

physCellId

Physical cell identity of a cell in the cell list.

MeasObjectNR field descriptions

absThreshCSI-RS-Consolidation

Absolute threshold for the consolidation of measurement results per CSI-RS resource(s) from L1 filter(s). The field is used for the derivation of cell measurement results as described in 5.5.3.3 and the reporting of beam measurement information per CSI-RS resource as described in 5.5.5.2.

absThreshSS-BlocksConsolidation

Absolute threshold for the consolidation of measurement results per SS/PBCH block(s) from L1 filter(s). The field is used for the derivation of cell measurement results as described in 5.5.3.3 and the reporting of beam measurement information per SS/PBCH block index as described in 5.5.5.2.

allowedCellsToAddModList

List of cells to add/modify in the allow-list of cells. It applies only to SSB resources.

allowedCellsToRemoveList

List of cells to remove from the allow-list of cells.

associatedMeasGapSSB

Indicates the associated measurement gap for SSB measuring identified by ssb-ConfigMobility in this measurement object. When multiple MeasObjectNR with the same SSB frequency are configured, the network configures the same measurement gap ID in this field for each MeasObjectNR. If this field is absent, the associated measurement gap is the gap configured via gapFR1, gapFR2, or gapUE.

associatedMeasGapSSB2

Indicates the associated additional measurement gap for SSB measuring identified by ssb-ConfigMobility in this measurement object for NTN deployments. When multiple MeasObjectNR with the same SSB frequency are configured, the network configures the same measurement gap ID in this field for each MeasObjectNR. If this field is absent, the associated measurement gap is the gap indicated by associatedMeasGapSSB.

associatedMeasGapCSIRS

Indicates the associated measurement gap for CSI-RS measuring identified by csi-rs-ResourceConfigMobility in this measurement object. If this field is absent, the associated measurement gap is the gap configured via gapFR1, gapFR2, or gapUE.

associatedMeasGapCSIRS2

Indicates the associated additional measurement gap for CSI-RS measuring identified by csi-rs-ResourceConfigMobility in this measurement object for NTN deployments. If this field is absent, the associated measurement gap is the gap indicated by associatedMeasGapCSIRS. In this release of the specification, this field is not configured for NTN deployments.

cellsToAddModList

List of cells to add/modify in the cell list.

cellsToRemoveList

List of cells to remove from the cell list.

excludedCellsToAddModList

List of cells to add/modify in the exclude-list of cells. It applies only to SSB resources.

excludedCellsToRemoveList

List of cells to remove from the exclude-list of cells.

fregBandIndicatorNR

The frequency band in which the SSB and/or CSI-RS indicated in this *MeasObjectNR* are located and according to which the UE shall perform the RRM measurements. This field is always provided when the network configures measurements with this *MeasObjectNR*.

measCvclePSCell

The parameter is used only when the PSCell is configured on the frequency indicated by the *measObjectNR* and the SCG is deactivated, see TS 38.133 [14]. The field may also be configured when the PSCell is not configured on that frequency. Value ms160 corresponds to 160 ms, value ms256 corresponds to 256 ms and so on.

measCycleSCell

The parameter is used only when an SCell is configured on the frequency indicated by the measObjectNR and is in deactivated state, see TS 38.133 [14]. gNB configures the parameter whenever an SCell is configured on the frequency indicated by the *measObjectNR*, but the field may also be signalled when an SCell is not configured. Value *sf160* corresponds to 160 sub-frames, value *sf256* corresponds to 256 sub-frames and so on.

nrofCSInrofCSI-RS-ResourcesToAverage

Indicates the maximum number of measurement results per beam based on CSI-RS resources to be averaged. The same value applies for each detected cell associated with this MeasObjectNR.

nrofSS-BlocksToAverage

Indicates the maximum number of measurement results per beam based on SS/PBCH blocks to be averaged. The same value applies for each detected cell associated with this *MeasObject*.

ntn-PolarizationDL

If present, this parameter indicates polarization information for downlink transmission on service link: including Right hand, Left hand circular polarizations (RHCP, LHCP) and Linear polarization.

ntn-PolarizationUL

If present, this parameter indicates polarization information for uplink transmission on service link. If not present and *ntn-PolarizationDL* is present, UE assumes the same polarization for UL and DL.

offsetMO

Offset values applicable to all measured cells with reference signal(s) indicated in this MeasObjectNR.

quantityConfigIndex

Indicates the n-th element of quantityConfigNR-List provided in MeasConfig.

referenceSignalConfig

RS configuration for SS/PBCH block and CSI-RS.

refFregCSI-RS

Point A which is used for mapping of CSI-RS to physical resources according to TS 38.211 [16] clause 7.4.1.5.3.

smtc1

Primary measurement timing configuration. (see clause 5.5.2.10).

smtc2

Secondary measurement timing configuration for SS corresponding to this *MeasObjectNR* with PCI listed in *pci-List*. For these SS, the periodicity is indicated by *periodicity* in *smtc2* and the timing offset is equal to the offset indicated in *periodicityAndOffset* modulo *periodicity*. *periodicity* in smtc2 can only be set to a value strictly shorter than the periodicity indicated by *periodicityAndOffset* in *smtc1* (e.g. if *periodicityAndOffset* indicates *sf10*, *periodicity* can only be set of *sf5*, if *periodicityAndOffset* indicates *sf5*, *smtc2* cannot be configured).

smtc3list

Measurement timing configuration list for SS corresponding to IAB-MT. This is used for the IAB-node's discovery of other IAB-nodes and the IAB-Donor-DUs.

smtc4list

Measurement timing configuration list for NTN deployments, see clause 5.5.2.10.

ssbFrequency

Indicates the frequency of the SS associated to this *MeasObjectNR*. For operation with shared spectrum channel access, this field is a k*30 kHz shift from the sync raster where k = 0,1,2, and so on if the *reportType* within the corresponding *ReportConfigNR* is set to reportCGI (see TS 38.211 [16], clause 7.4.3.1). Frequencies are considered to be on the sync raster if they are also identifiable with a GSCN value (see TS 38.101-1 [15]).

ssb-PositionQCL-Common

Indicates the QCL relationship between SS/PBCH blocks for all measured cells as specified in TS 38.213 [13], clause 4.1.

ssbSubcarrierSpacing

Subcarrier spacing of SSB.

Only the following values are applicable depending on the used frequency:

FR1: 15 or 30 kHz FR2-1: 120 or 240 kHz FR2-2: 120, 480, or 960 kHz

t312

The value of timer T312. Value ms0 represents 0 ms, ms50 represents 50 ms and so on.

ReferenceSignalConfig field descriptions

csi-rs-ResourceConfigMobility

CSI-RS resources to be used for CSI-RS based RRM measurements.

ssb-ConfigMobility

SSB configuration for mobility (nominal SSBs, timing configuration).

RMTC-Config field descriptions

measDurationSymbols

Number of consecutive symbols for which the Physical Layer reports samples of RSSI (see TS 38.215 [9], clause 5.1.21). Value sym1 corresponds to one symbol, sym14or12 corresponds to 14 symbols of the reference numerology for NCP and 12 symbols for ECP, and so on.

If measDurationSymbols-v1700 is signalled, the UE ignores measDurationSymbols-r16.

ref-BWPId

Indicates the reference BWP for the TCI state indicated in *tci-StateInfo*. Network includes this field if *tci-StateInfo* is present. This field is only applicable for operation with shared spectrum channel access in FR2-2 and network does not configure this if the UE does not have any serving cells in FR2-2.

ref-SCS-CP

Indicates a reference subcarrier spacing and cyclic prefix to be used for RSSI measurements (see TS 38.215 [9]). Value kHz15 corresponds to 15kHz, kHz30 corresponds to 30 kHz, value kHz60-NCP corresponds to 60 kHz using normal cyclic prefix (NCP), and kHz60-ECP corresponds to 60 kHz using extended cyclic prefix (ECP). If ref-SCS-CP-v1700 is signalled, the UE ignores ref-SCS-CP-r16.

ref-ServCellId

Indicates the FR2-2 reference serving cell index for the TCI state. Network includes this field if *tci-StateInfo* is present. This field is only applicable for operation with shared spectrum channel access in FR2-2 and network does not configure this if the UE does not have any serving cells in FR2-2.

rmtc-Bandwidth

Indicates the bandwidth for the RSSI measurement (see TS 38. 215 [9], clause 5.1.21).

rmtc-Frequency

Indicates the center frequency of the measured bandwidth for a frequency which operates with shared spectrum channel access (see TS 38. 215 [9], clause 5.1.21).

rmtc-Periodicity

Indicates the RSSI measurement timing configuration (RMTC) periodicity (see TS 38.215 [9], clause 5.1.21).

rmtc-SubframeOffset

Indicates the RSSI measurement timing configuration (RMTC) subframe offset for this frequency (see TS 38.215 [9], clause 5.1.21). For inter-frequency measurements, this field is optional present and if it is not configured, the UE chooses a random value as *rmtc-SubframeOffset* for *measDurationSymbols* which shall be selected to be between 0 and the configured *rmtc-Periodicity* with equal probability.

tci-StateId

Indicates the TCI state to be used for RSSI measurements. This field is only applicable for shared spectrum channel access in FR2-2. Network does not configure this if the UE does not have any serving cells in FR2-2 and in such a case, it is up to UE implementation how to determine the spatial domain filter for the inter-frequency RSSI measurement in FR2-2.

SSB-ConfigMobility field descriptions

cca-CellsToAddModList, cca-CellsToRemoveList

Lists of cells to be added or removed from the list of neighbor cells that apply channel access mode procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2.

deriveSSB-IndexFromCell

If this field is set to *true*, UE assumes SFN and frame boundary alignment across cells on the same frequency carrier as specified in TS 38.133 [14]. Hence, if the UE is configured with a serving cell for which (*absoluteFrequencySSB*, *subcarrierSpacing*) in *ServingCellConfigCommon* is equal to (*ssbFrequency*, *ssbSubcarrierSpacing*) in this *MeasObjectNR*, this field indicates whether the UE can utilize the timing of this serving cell to derive the index of SS block transmitted by neighbour cell. Otherwise, this field indicates whether the UE may use the timing of any detected cell on that target frequency to derive the SSB index of all neighbour cells on that frequency.

deriveSSB-IndexFromCellInter

If this field is present, UE assumes SFN and frame boundary alignment between the reference serving cell indicated by ServCellIndex and all neighbour cells in this MeasObjectNR as specified in TS 38.133 [14]. This field also indicates that the UE can utilize the timing of the reference serving cell indicated by ServCellIndex to derive the index of SS block transmitted by all inter-frequency neighbour cells on the frequency indicated by the MeasObjectNR. When this field is included, the network should set deriveSSB-IndexFromCell to true.

ssb-ToMeasure

The set of SS blocks to be measured within the SMTC measurement duration. The first/leftmost bit corresponds to SS/PBCH block index 0, the second bit corresponds to SS/PBCH block index 1, and so on. Value 0 in the bitmap indicates that the corresponding SS/PBCH block is not to be measured while value 1 indicates that the corresponding SS/PBCH block is to be measured (see TS 38.215 [9]). When the field is not configured the UE measures on all SS blocks. Regardless of the value of this field, SS/PBCH blocks outside of the applicable *smtc* are not to be measured. See TS 38.215 [9] clause 5.1.1.

SSB-PositionQCL-CellsToAddMod field descriptions

physCellId

Physical cell identity of a cell in the cell list.

ssb-PositionQCL

Indicates the QCL relation between SS/PBCH blocks for a specific cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the value signalled by ssb-PositionQCL-Common.

Conditional Presence	Explanation
AssociatedGapCSIRS	This field is optionally present, Need R if associatedMeasGapCSIRS is configured, otherwise, it is absent.
AssociatedGapSSB	This field is optionally present, Need R if associatedMeasGapSSB is configured, otherwise, it is absent.
CSI-RS	This field is mandatory present if csi-rs-ResourceConfigMobility is configured, otherwise, it is absent.
IntraFreqConnected	This field is optionally present, Need R if the UE is configured with a serving cell for which (absoluteFrequencySSB,
	subcarrierSpacing) in ServingCellConfigCommon is equal to (ssbFrequency, ssbSubcarrierSpacing) in this MeasObjectNR,
	otherwise, it is absent.
SCG	This field is optionally present, Need R, in the measConfig associated with the SCG. It is absent in the measConfig
	associated with the MCG.
SharedSpectrum	This field is mandatory present if this <i>MeasObject</i> is for a frequency which operates with shared spectrum channel access in
	FR1. Otherwise, it is absent, Need R.
SharedSpectrum2	This field is optionally present if this MeasObject is for a frequency which operates with shared spectrum channel access in
	FR2-2, Need R. Otherwise, it is absent, Need R.
SSBorAssociatedSSB	This field is mandatory present if ssb-ConfigMobility is configured or associatedSSB is configured in at least one cell.
	Otherwise, it is absent, Need R.

MeasObjectNR-SL

The IE *MeasObjectNR-SL* concerns a measurement object including a list of transmission resource pool(s) for which CBR measurement is performed for NR sidelink communication/discovery.

MeasObjectNR-SL information element

MeasObjectRxTxDiff

The IE MeasObjectRxTxDiff is used to configure the measurement object for UE Rx-Tx time difference measurement.

MeasObjectRxTxDiff information element

MeasObjectRxTxDiff field descriptions

dl-Ref

configures the DL references signals to measure Rx-Tx time difference. *prs-Ref-r17* indicates PRS is chosen, and *csi-RS-Ref-r17* indicates that CSI-RS for tracking is chosen. Only one PRS resource set is configured by the network. Only one *NZP-CSI-RS-ResourceSet* can be configured with *pdc-Info-r17* set to *true* and it is used for UE Rx-Tx time difference measurement. Only reference signals from the PCell of the MCG can be configured by the network.

MeasObjectToAddModList

The IE MeasObjectToAddModList concerns a list of measurement objects to add or modify.

MeasObjectToAddModList information element

```
-- ASN1START
-- TAG-MEASOBJECTTOADDMODLIST-START
MeasObjectToAddModList ::=
                                             SEQUENCE (SIZE (1..maxNrofObjectId)) OF MeasObjectToAddMod
MeasObjectToAddMod ::=
                                             SEQUENCE {
    measObjectId
                                                 MeasObjectId,
    measObject
                                                 CHOICE {
        measObjectNR
                                                     MeasObjectNR,
        . . . ,
        measObjectEUTRA
                                                     MeasObjectEUTRA,
        measObjectUTRA-FDD-r16
                                                     MeasObjectUTRA-FDD-r16,
        measObjectNR-SL-r16
                                                     MeasObjectNR-SL-r16,
        measObjectCLI-r16
                                                     MeasObjectCLI-r16,
        measObjectRxTxDiff-r17
                                                     MeasObjectRxTxDiff-r17,
        measObjectRelay-r17
                                                     SL-MeasObject-r16
-- TAG-MEASOBJECTTOADDMODLIST-STOP
-- ASN1STOP
```

MeasObjectUTRA-FDD

The IE MeasObjectUTRA-FDD specifies information applicable for inter-RAT UTRA-FDD neighbouring cells.

MeasObjectUTRA-FDD information element

```
-- ASN1START
-- TAG-MEASOBJECTUTRA-FDD-START

MeasObjectUTRA-FDD-r16 ::= SEQUENCE {
    carrierFreq-r16 ARFCN-ValueUTRA-FDD-r16,
    utra-FDD-Q-OffsetRange-r16 UTRA-FDD-Q-OffsetRange-r16 OPTIONAL, -- Need R
    cellsTORemoveList-r16 UTRA-FDD-CellIndexList-r16 OPTIONAL, -- Need N
```

```
cellsToAddModList-r16
                                                CellsToAddModListUTRA-FDD-r16
                                                                                        OPTIONAL,
                                                                                                           -- Need N
CellsToAddModListUTRA-FDD-r16 ::=
                                            SEQUENCE (SIZE (1..maxCellMeasUTRA-FDD-r16)) OF CellsToAddModUTRA-FDD-r16
CellsToAddModUTRA-FDD-r16 ::=
                                            SEOUENCE {
    cellIndexUTRA-FDD-r16
                                                UTRA-FDD-CellIndex-r16,
   physCellId-r16
                                                PhysCellIdUTRA-FDD-r16
UTRA-FDD-CellIndexList-r16 ::=
                                            SEQUENCE (SIZE (1..maxCellMeasUTRA-FDD-r16)) OF UTRA-FDD-CellIndex-r16
UTRA-FDD-CellIndex-r16 ::=
                                            INTEGER (1..maxCellMeasUTRA-FDD-r16)
-- TAG-MEASOBJECTUTRA-FDD-STOP
-- ASN1STOP
```

MeasObjectUTRA-FDD field descriptions

carrierFreq

Identifies UTRA-FDD carrier frequency for which this configuration is valid. NR does not configure more than one measurement object for the same physical frequency regardless of the ARFCN used to indicate this.

cellIndexUTRA-FDD

Entry index in the neighbouring cell list.

cellsToAddModList

List of UTRA-FDD cells to add/modify in the neighbouring cell list.

cellsToRemoveList

List of cells to remove from the neighbouring cell list.

utra-FDD-Q-OffsetRange

Used to indicate a frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value is in dB.

MeasResultCellListSFTD-NR

The IE MeasResultCellListSFTD-NR consists of SFN and radio frame boundary difference between the PCell and an NR cell as specified in TS 38.215 [9] and TS 38.133 [14].

MeasResultCellListSFTD-NR information element

```
-- ASN1START
-- TAG-MEASRESULTCELLLISTSFTD-NR-START

MeasResultCellListSFTD-NR ::= SEQUENCE (SIZE (1..maxCellSFTD)) OF MeasResultCellSFTD-NR

MeasResultCellSFTD-NR ::= SEQUENCE {
    physCellId PhysCellId,
    sfn-OffsetResult INTEGER (0..1023),
    frameBoundaryOffsetResult INTEGER (-30720..30719),
    rsrp-Result RSRP-Range OPTIONAL
```

```
-- TAG-MEASRESULTCELLLISTSFTD-NR-STOP
-- ASN1STOP
```

MeasResultCellSFTD-NR field descriptions

sfn-OffsetResult

Indicates the SFN difference between the PCell and the NR cell as an integer value according to TS 38.215 [9].

frameBoundaryOffsetResult

Indicates the frame boundary difference between the PCell and the NR cell as an integer value according to TS 38.215 [9].

MeasResultCellListSFTD-EUTRA

The IE MeasResultCellListSFTD-EUTRA consists of SFN and radio frame boundary difference between the PCell and an E-UTRA PSCell.

MeasResultCellListSFTD-EUTRA information element

```
-- ASN1START
-- TAG-MEASRESULTCELLLISTSFTD-EUTRA-START
MeasResultCellListSFTD-EUTRA ::=
                                          SEOUENCE (SIZE (1..maxCellSFTD)) OF MeasResultSFTD-EUTRA
MeasResultSFTD-EUTRA ::=
                                  SEOUENCE {
    eutra-PhysCellId
                                       EUTRA-PhysCellId,
    sfn-OffsetResult
                                       INTEGER (0..1023),
    frameBoundaryOffsetResult
                                       INTEGER (-30720..30719),
    rsrp-Result
                                       RSRP-Range
                                                                       OPTIONAL
-- TAG-MEASRESULTCELLLISTSFTD-EUTRA-STOP
-- ASN1STOP
```

MeasResultSFTD-EUTRA field descriptions

eutra-PhysCellId

Identifies the physical cell identity of the E-UTRA cell for which the reporting is being performed.

sfn-OffsetResult

Indicates the SFN difference between the PCell and the E-UTRA cell as an integer value according to TS 38.215 [9].

frameBoundaryOffsetResult

Indicates the frame boundary difference between the PCell and the E-UTRA cell as an integer value according to TS 38.215 [9].

MeasResults

The IE MeasResults covers measured results for intra-frequency, inter-frequency, inter-RAT mobility and measured results for NR sidelink communication/discovery.

MeasResults information element

```
-- ASN1START
-- TAG-MEASRESULTS-START
MeasResults ::=
                                         SEOUENCE {
    measId
                                             MeasId,
    measResultServingMOList
                                             MeasResultServMOList,
    measResultNeighCells
                                             CHOICE {
        measResultListNR
                                                 MeasResultListNR,
        measResultListEUTRA
                                                 MeasResultListEUTRA,
        measResultListUTRA-FDD-r16
                                                 MeasResultListUTRA-FDD-r16,
        sl-MeasResultsCandRelay-r17
                                                                      -- Contains PC5 SL-MeasResultListRelay-r17
                                                 OCTET STRING
                                                                                                                           OPTIONAL,
    ] ]
    measResultServFreqListEUTRA-SCG
                                             MeasResultServFreqListEUTRA-SCG
                                                                                                                           OPTIONAL,
    measResultServFreqListNR-SCG
                                             MeasResultServFreqListNR-SCG
                                                                                                                           OPTIONAL,
    measResultSFTD-EUTRA
                                             MeasResultSFTD-EUTRA
                                                                                                                           OPTIONAL,
    measResultSFTD-NR
                                             MeasResultCellSFTD-NR
                                                                                                                           OPTIONAL
    11,
    1 1
    measResultCellListSFTD-NR
                                             MeasResultCellListSFTD-NR
                                                                                                                           OPTIONAL
    ]],
    ] ]
    measResultForRSSI-r16
                                             MeasResultForRSSI-r16
                                                                                                                           OPTIONAL,
    locationInfo-r16
                                             LocationInfo-r16
                                                                                                                           OPTIONAL,
    ul-PDCP-DelayValueResultList-r16
                                             UL-PDCP-DelayValueResultList-r16
                                                                                                                           OPTIONAL,
    measResultsSL-r16
                                             MeasResultsSL-r16
                                                                                                                           OPTIONAL,
    measResultCLI-r16
                                             MeasResultCLI-r16
                                                                                                                           OPTIONAL
    11,
    11
    measResultRxTxTimeDiff-r17
                                             MeasResultRxTxTimeDiff-r17
                                                                                                                           OPTIONAL,
    sl-MeasResultServingRelay-r17
                                             OCTET STRING
                                                                                                                           OPTIONAL,
                                                                                            -- Contains PC5 SL-MeasResultRelay-r17
    ul-PDCP-ExcessDelayResultList-r17
                                             UL-PDCP-ExcessDelayResultList-r17
                                                                                                                           OPTIONAL,
    coarseLocationInfo-r17
                                             OCTET STRING
                                                                                                                           OPTIONAL
    ]]
MeasResultServMOList ::=
                                         SEQUENCE (SIZE (1..maxNrofServingCells)) OF MeasResultServMO
MeasResultServMO ::=
                                         SEQUENCE {
    servCellId
                                             ServCellIndex,
    measResultServingCell
                                             MeasResultNR,
    measResultBestNeighCell
                                             MeasResultNR
                                                                                                                           OPTIONAL,
    . . .
MeasResultListNR ::=
                                         SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultNR
MeasResultNR ::=
                                         SEQUENCE {
                                             PhysCellId
    physCellId
                                                                                                                           OPTIONAL,
```

```
measResult
                                             SEOUENCE {
       cellResults
                                                 SEQUENCE {
            resultsSSB-Cell
                                                     MeasQuantityResults
                                                                                                                           OPTIONAL,
            resultsCSI-RS-Cell
                                                     MeasQuantityResults
                                                                                                                           OPTIONAL
       rsIndexResults
                                                 SEQUENCE {
            resultsSSB-Indexes
                                                     ResultsPerSSB-IndexList
                                                                                                                           OPTIONAL,
            resultsCSI-RS-Indexes
                                                     ResultsPerCSI-RS-IndexList
                                                                                                                           OPTIONAL
                                                                                                                           OPTIONAL
    },
    ] ]
    cai-Info
                                             CGI-InfoNR
                                                                                                                           OPTIONAL
    ]] ,
    Π
    choCandidate-r17
                                             ENUMERATED {true}
                                                                                                                           OPTIONAL,
    choConfig-r17
                                             SEQUENCE (SIZE (1..2)) OF CondTriggerConfig-r16
                                                                                                                           OPTIONAL,
    triggeredEvent-r17
                                             SEOUENCE {
        timeBetweenEvents-r17
                                                 TimeBetweenEvent-r17
                                                                                                                           OPTIONAL,
        firstTriggeredEvent
                                                 ENUMERATED {condFirstEvent, condSecondEvent}
                                                                                                                           OPTIONAL
                                                                                                                           OPTIONAL
    ]]
MeasResultListEUTRA ::=
                                         SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultEUTRA
MeasResultEUTRA ::=
                                         SEOUENCE {
                                             PhysCellId,
    eutra-PhysCellId
    measResult
                                             MeasOuantityResultsEUTRA,
    cgi-Info
                                             CGI-InfoEUTRA
                                                                                                                           OPTIONAL,
MultiBandInfoListEUTRA ::=
                                         SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicatorEUTRA
MeasQuantityResults ::=
                                         SEQUENCE {
                                                                                                                           OPTIONAL,
    rsrp
                                             RSRP-Range
                                             RSRQ-Range
                                                                                                                           OPTIONAL,
    rsrq
    sinr
                                             SINR-Range
                                                                                                                           OPTIONAL
MeasQuantityResultsEUTRA ::=
                                         SEQUENCE {
                                             RSRP-RangeEUTRA
                                                                                                                           OPTIONAL,
    rsrp
                                             RSRQ-RangeEUTRA
                                                                                                                           OPTIONAL.
    rsra
    sinr
                                             SINR-RangeEUTRA
                                                                                                                           OPTIONAL
ResultsPerSSB-IndexList::=
                                         SEQUENCE (SIZE (1..maxNrofIndexesToReport2)) OF ResultsPerSSB-Index
ResultsPerSSB-Index ::=
                                         SEOUENCE {
    ssb-Index
                                             SSB-Index,
    ssb-Results
                                             MeasQuantityResults
                                                                                                                           OPTIONAL
```

```
ResultsPerCSI-RS-IndexList::=
                                        SEQUENCE (SIZE (1..maxNrofIndexesToReport2)) OF ResultsPerCSI-RS-Index
ResultsPerCSI-RS-Index ::=
                                        SEOUENCE {
    csi-RS-Index
                                            CSI-RS-Index.
    csi-RS-Results
                                            MeasOuantityResults
                                                                                                                         OPTIONAL
MeasResultServFreqListEUTRA-SCG ::= SEQUENCE (SIZE (1..maxNrofServingCellsEUTRA)) OF MeasResult2EUTRA
MeasResultServFreqListNR-SCG ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF MeasResult2NR
MeasResultListUTRA-FDD-r16 ::=
                                        SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultUTRA-FDD-r16
MeasResultUTRA-FDD-r16 ::=
                                        SEOUENCE {
                                            PhysCellIdUTRA-FDD-r16,
    physCellId-r16
   measResult-r16
                                            SEOUENCE {
                                                INTEGER (-5..91)
       utra-FDD-RSCP-r16
                                                                          OPTIONAL,
       utra-FDD-EcN0-r16
                                                INTEGER (0..49)
                                                                          OPTIONAL
MeasResultForRSSI-r16 ::=
                                 SEQUENCE {
   rssi-Result-r16
                                     RSSI-Range-r16,
    channelOccupancy-r16
                                     INTEGER (0..100)
MeasResultCLI-r16 ::=
                                 SEOUENCE {
    measResultListSRS-RSRP-r16
                                     MeasResultListSRS-RSRP-r16
                                                                                                                         OPTIONAL,
                                     MeasResultListCLI-RSSI-r16
    measResultListCLI-RSSI-r16
                                                                                                                         OPTIONAL
MeasResultListSRS-RSRP-r16 ::=
                                SEQUENCE (SIZE (1.. maxCLI-Report-r16)) OF MeasResultSRS-RSRP-r16
MeasResultSRS-RSRP-r16 ::=
                                 SEQUENCE {
    srs-ResourceId-r16
                                     SRS-ResourceId,
    srs-RSRP-Result-r16
                                     SRS-RSRP-Range-r16
MeasResultListCLI-RSSI-r16 ::= SEQUENCE (SIZE (1.. maxCLI-Report-r16)) OF MeasResultCLI-RSSI-r16
                                 SEQUENCE {
MeasResultCLI-RSSI-r16 ::=
    rssi-ResourceId-r16
                                     RSSI-ResourceId-r16,
    cli-RSSI-Result-r16
                                     CLI-RSSI-Range-r16
UL-PDCP-DelayValueResultList-r16 ::= SEQUENCE (SIZE (1..maxDRB)) OF UL-PDCP-DelayValueResult-r16
UL-PDCP-DelayValueResult-r16 ::= SEQUENCE {
    drb-Id-r16
                                     DRB-Identity,
    averageDelay-r16
                                     INTEGER (0..10000),
UL-PDCP-ExcessDelayResultList-r17 ::= SEQUENCE (SIZE (1..maxDRB)) OF UL-PDCP-ExcessDelayResult-r17
```

MeasResultEUTRA field descriptions

eutra-PhysCellId

Identifies the physical cell identity of the E-UTRA cell for which the reporting is being performed. The UE reports a value in the range 0..503, other values are reserved.

MeasResultNR field descriptions

averageDelay

Indicates average delay for the packets during the reporting period, as specified in TS 38.314 [53]. Value 0 corresponds to 0 millisecond, value 1 corresponds to 0.1 millisecond, value 2 corresponds to 0.2 millisecond, and so on.

cellResults

Cell level measurement results.

choCandidate

This field indicates whether the associated cell is a candidate target cell for conditional handover. This field may be included only in the *SuccessHO-Report* within *UEInformationResponse* message.

choConfig

If the associated cell is a candidate target cell for conditional handover, this field indicates the conditional handover execution condition for each *measld* within *condTriggerConfig* associated to the cell. This field may be included only in the *rlf-report* within *UEInformationResponse* message.

drb-ld

Indicates DRB value for which uplink PDCP delay ratio or value is provided, according to TS 38.314 [53].

firstTriggeredEvent

This field is set to *condFirstEvent* if the execution condition associated to the first entry of *choConfig* was fulfilled first in time. This field is set to *condSecondEvent* if the execution condition associated to the second entry of *choConfig* was fulfilled first in time. This field may be included only in *rlf-report* within *UEInformationResponse* message.

locationInfo

Positioning related information and measurements.

physCellId

The physical cell identity of the NR cell for which the reporting is being performed.

resultsSSB-Cell

Cell level measurement results based on SS/PBCH related measurements.

resultsSSB-Indexes

Beam level measurement results based on SS/PBCH related measurements.

resultsCSI-RS-Cell

Cell level measurement results based on CSI-RS related measurements.

resultsCSI-RS-Indexes

Beam level measurement results based on CSI-RS related measurements.

rsIndexResults

Beam level measurement results.

timeBetweenEvents

Indicates the time elapsed between fulfilling the conditional execution conditions included in *choConfig*. Value in milliseconds. The maximum value 1023 means 1023ms or longer. This field may be included only in the reports associated to *UEInformationResponse* message, e.g., *rlf-Report*.

MeasResultUTRA-FDD field descriptions

physCellId

The physical cell identity of the UTRA-FDD cell for which the reporting is being performed.

utra-FDD-EcN0

According to CPICH_Ec/No in TS 25.133 [46] for FDD.

utra-FDD-RSCP

According to CPICH_RSCP in TS 25.133 [46] for FDD.

MeasResults field descriptions

coarseLocationInfo

This field indicates the coarse location information reported by the UE. This field is coded as the *Ellipsoid-Point* defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit. The least significant bits of *degreesLatitude* and *degreesLongitude* are set to 0 to meet the accuracy requirement corresponds to a granularity of approximately 2 km.

It is up to UE implementation how many LSBs are set to 0 to meet the accuracy requirement

excessDelay

Indicates the ratio of packets in UL per DRB exceeding the configured delay threshold among the UL PDCP SDUs, according to the UL PDCP Excess Packet Delay per DRB mapping table, as defined in TS 38.314 [53], Table 4.3.1.e-1.

measId

Identifies the measurement identity for which the reporting is being performed.

measQuantityResults

The value sinr is not included when it is used for LogMeasReport-r16.

measResultCellListSFTD-NR

SFTD measurement results between the PCell and the NR neighbour cell(s) in NR standalone.

measResultCLI

CLI measurement results.

measResultEUTRA

Measured results of an E-UTRA cell.

measResultForRSSI

Includes measured RSSI result in dBm (see TS 38.215 [9]) and channelOccupancy which is the percentage of samples when the RSSI was above the configured channelOccupancyThreshold for the associated reportConfig.

measResultListEUTRA

List of measured results for the maximum number of reported best cells for an E-UTRA measurement identity.

measResultListNR

List of measured results for the maximum number of reported best cells for an NR measurement identity.

measResultListUTRA-FDD

List of measured results for the maximum number of reported best cells for a UTRA-FDD measurement identity.

measResultNR

Measured results of an NR cell.

measResultServFreqListEUTRA-SCG

Measured results of the E-UTRA SCG serving frequencies: the measurement result of PSCell and each SCell, if any, and of the best neighbouring cell on each E-UTRA SCG serving frequency.

measResultServFreqListNR-SCG

Measured results of the NR SCG serving frequencies: the measurement result of PSCell and each SCell, if any, and of the best neighbouring cell on each NR SCG serving frequency.

measResultServingMOList

Measured results of measured cells with reference signals indicated in the serving cell measurement objects including measurement results of SpCell, configured SCell(s) and best neighbouring cell within measured cells with reference signals indicated in on each serving cell measurement object. If the sending of the *MeasurementReport* message is triggered by a measurement configured by the field *sl-ConfigDedicatedForNR* received within an E-UTRA *RRCConnectionReconfiguration* message (i.e. CBR measurements), this field is not applicable and its contents is ignored by the network.

measResultSFTD-EUTRA

SFTD measurement results between the PCell and the E-UTRA PScell in NE-DC.

measResultSFTD-NR

SFTD measurement results between the PCell and the NR PScell in NR-DC.

MeasResults field descriptions

coarseLocationInfo

This field indicates the coarse location information reported by the UE. This field is coded as the *Ellipsoid-Point* defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit. The least significant bits of *degreesLatitude* and *degreesLongitude* are set to 0 to meet the accuracy requirement corresponds to a granularity of approximately 2 km.

It is up to UE implementation how many LSBs are set to 0 to meet the accuracy requirement

excessDelay

Indicates the ratio of packets in UL per DRB exceeding the configured delay threshold among the UL PDCP SDUs, according to the UL PDCP Excess Packet Delay per DRB mapping table, as defined in TS 38.314 [53], Table 4.3.1.e-1.

measResultsSL

CBR measurements results for NR sidelink communication/discovery.

measResultUTRA-FDD

Measured result of a UTRA-FDD cell.

sI-MeasResultsCandRelay

Measurement result(s) of candiate L2 U2N relay UE(s).

sl-MeasResultServingRelay

Measurement result of serving L2 U2N relay UE.

MeasResult2EUTRA

The IE MeasResult2EUTRA contains measurements on E-UTRA frequencies.

MeasResult2EUTRA information element

MeasResult2NR

The IE MeasResult2NR contains measurements on NR frequencies.

MeasResult2NR information element

```
-- ASN1START
```

⁻⁻ TAG-MEASRESULT2NR-START

```
MeasResult2NR ::=
                                    SEOUENCE {
    ssbFrequency
                                        ARFCN-ValueNR
                                                                                  OPTIONAL.
    refFreqCSI-RS
                                        ARFCN-ValueNR
                                                                                 OPTIONAL,
    measResultServingCell
                                        MeasResultNR
                                                                                 OPTIONAL,
    measResultNeighCellListNR
                                        MeasResultListNR
                                                                                 OPTIONAL,
-- TAG-MEASRESULT2NR-STOP
-- ASN1STOP
```

MeasResultIdleEUTRA

-- ASN1STOP

The IE MeasResultIdleEUTRA covers the E-UTRA measurement results performed in RRC_IDLE and RRC_INACTIVE.

MeasResultIdleEUTRA information element

```
-- ASN1START
-- TAG-MEASRESULTIDLEEUTRA-START
MeasResultIdleEUTRA-r16 ::= SEQUENCE {
    measResultsPerCarrierListIdleEUTRA-r16 SEQUENCE (SIZE (1.. maxFreqIdle-r16)) OF MeasResultsPerCarrierIdleEUTRA-r16,
MeasResultsPerCarrierIdleEUTRA-r16 ::= SEQUENCE {
    carrierFreqEUTRA-r16
                                            ARFCN-ValueEUTRA,
    measResultsPerCellListIdleEUTRA-r16
                                            SEQUENCE (SIZE (1..maxCellMeasIdle-r16)) OF MeasResultsPerCellIdleEUTRA-r16,
MeasResultsPerCellIdleEUTRA-r16 ::=
                                        SEQUENCE {
                                            EUTRA-PhysCellId,
    eutra-PhysCellId-r16
    measIdleResultEUTRA-r16
                                            SEQUENCE {
                                                RSRP-RangeEUTRA
       rsrp-ResultEUTRA-r16
                                                                                                                     OPTIONAL,
                                                RSRQ-RangeEUTRA-r16
                                                                                                                     OPTIONAL
       rsrq-ResultEUTRA-r16
-- TAG-MEASRESULTIDLEEUTRA-STOP
```

MeasResultIdleEUTRA field descriptions

carrierFreqEUTRA

Indicates the E-UTRA carrier frequency.

eutra-PhysCellId

Indicates the physical cell identity of an E-UTRA cell.

measIdleResultEUTRA

Idle/inactive measurement results for an E-UTRA cell.

measResultsPerCarrierListIdleEUTRA

List of idle/inactive measured results for the maximum number of reported E-UTRA carriers.

measResultsPerCellListIdleEUTRA

List of idle/inactive measured results for the maximum number of reported best cells for a given E-UTRA carrier.

MeasResultIdleNR

The IE MeasResultIdleNR covers the NR measurement results performed in RRC IDLE and RRC INACTIVE.

MeasResultIdleNR information element

```
-- ASN1START
-- TAG-MEASRESULTIDLENR-START
MeasResultIdleNR-r16 ::= SEOUENCE {
    measResultServingCell-r16 SEQUENCE {
       rsrp-Result-r16
                                 RSRP-Range
                                                                                                                   OPTIONAL,
       rsrq-Result-r16
                                 RSRQ-Range
                                                                                                                   OPTIONAL,
       resultsSSB-Indexes-r16 ResultsPerSSB-IndexList-r16
                                                                                                                   OPTIONAL
   measResultsPerCarrierListIdleNR-r16 SEQUENCE (SIZE (1.. maxFreqIdle-r16)) OF MeasResultsPerCarrierIdleNR-r16
                                                                                                                   OPTIONAL,
MeasResultsPerCarrierIdleNR-r16 ::= SEQUENCE {
    carrierFreg-r16
                                         ARFCN-ValueNR,
    measResultsPerCellListIdleNR-r16
                                         SEQUENCE (SIZE (1..maxCellMeasIdle-r16)) OF MeasResultsPerCellIdleNR-r16,
MeasResultsPerCellIdleNR-r16 ::= SEOUENCE {
    physCellId-r16
                                     PhysCellId,
                                     SEQUENCE {
   measIdleResultNR-r16
       rsrp-Result-r16
                                         RSRP-Range
                                                                                                                 OPTIONAL,
       rsrg-Result-r16
                                         RSRQ-Range
                                                                                                                 OPTIONAL,
       resultsSSB-Indexes-r16
                                         ResultsPerSSB-IndexList-r16
                                                                                                                 OPTIONAL
ResultsPerSSB-IndexList-r16 ::= SEQUENCE (SIZE (1.. maxNrofIndexesToReport)) OF ResultsPerSSB-IndexIdle-r16
```

OPTIONAL, OPTIONAL OPTIONAL

MeasResultIdleNR field descriptions

carrierFreq

Indicates the NR carrier frequency.

measIdleResultNR

Idle/inactive measurement results for an NR cell (optionally including beam level measurements).

measResultServingCell

Measured results of the serving cell (i.e., PCell) from idle/inactive measurements.

measResultsPerCellListIdleNR

List of idle/inactive measured results for the maximum number of reported best cells for a given NR carrier.

resultsSSB-Indexes

Beam level measurement results (indexes and optionally, beam measurements).

MeasResultRxTxTimeDiff

The IE MeasResultRxTxTimeDiff is used to provide Rx-Tx time difference measurement result.

MeasResultRxTxTimeDiff information element

MeasResultRxTxTimeDiff field descriptions

rxTxTimeDiff-ue

indicates the Rx-Tx Time difference measurement at the UE (see clause 5.1.30, TS 38.215 [9]).

MeasResultSCG-Failure

The IE MeasResultSCG-Failure is used to provide information regarding failures detected by the UE in (NG)EN-DC and NR-DC.

MeasResultSCG-Failure information element

- MeasResultsSL

The IE MeasResultsSL covers measured results for NR sidelink communication/discovery.

MeasResultsSL information element

```
-- ASN1START
-- TAG-MEASRESULTSSL-START
MeasResultsSL-r16 ::=
                              SEQUENCE {
    measResultsListSL-r16
                                  CHOICE {
                                      MeasResultNR-SL-r16,
        measResultNR-SL-r16
MeasResultNR-SL-r16 ::=
                              SEQUENCE {
    measResultListCBR-NR-r16
                                  SEQUENCE (SIZE (1.. maxNrofSL-PoolToMeasureNR-r16)) OF MeasResultCBR-NR-r16,
MeasResultCBR-NR-r16 ::=
                              SEQUENCE {
    sl-poolReportIdentity-r16
                                  SL-ResourcePoolID-r16,
    sl-CBR-ResultsNR-r16
                                  SL-CBR-r16,
```

-- TAG-MEASRESULTSSL-STOP -- ASN1STOP

MeasResultsSL field descriptions

measResultNR-SL

Include the measured results for NR sidelink communication/discovery.

MeasResultNR-SL field descriptions

measResultListCBR-NR

CBR measurement results for NR sidelink communication/discovery.

sl-poolReportIdentity

The identity of the transmission resource pool which is corresponding to the sl-ResourcePoolID configured in a resource pool for NR sidelink communication/discovery.

- MeasTriggerQuantityEUTRA

The IE *MeasTriggerQuantityEUTRA* is used to configure the trigger quantity and reporting range for E-UTRA measurements. The RSRP, RSRQ and SINR ranges correspond to *RSRP-Range*, *RSRQ-Range* and *RS-SINR-Range* in TS 36.331 [10], respectively.

MeasTriggerQuantityEUTRA information element

```
-- ASN1START
-- TAG-MEASTRIGGERQUANTITYEUTRA-START
MeasTriggerQuantityEUTRA::=
                                            CHOICE {
   rsrp
                                                RSRP-RangeEUTRA,
                                                RSRQ-RangeEUTRA,
    rsrq
    sinr
                                                SINR-RangeEUTRA
RSRP-RangeEUTRA ::=
                                    INTEGER (0..97)
RSRQ-RangeEUTRA ::=
                                    INTEGER (0..34)
                                    INTEGER (0..127)
SINR-RangeEUTRA ::=
-- TAG-MEASTRIGGERQUANTITYEUTRA-STOP
-- ASN1STOP
```

MobilityStateParameters 4 6 1

The IE MobilityStateParameters contains parameters to determine UE mobility state.

MobilityStateParameters information element

MobilityStateParameters field descriptions

n-CellChangeHigh

The number of cell changes to enter high mobility state. Corresponds to NcR_H in TS 38.304 [20].

n-CellChangeMedium

The number of cell changes to enter medium mobility state. Corresponds to NCR M in TS 38.304 [20].

t-Evaluation

The duration for evaluating criteria to enter mobility states. Corresponds to TCRmax in TS 38.304 [20]. Value in seconds, s30 corresponds to 30 s and so on.

t-HystNormal

The additional duration for evaluating criteria to enter normal mobility state. Corresponds to T_{CRmaxHyst} in TS 38.304 [20]. Value in seconds, value s30 corresponds to 30 seconds and so on.

- MRB-Identity

The IE MRB-Identity is used to identify a multicast MRB used by a UE.

MRB-Identity information element

```
-- ASN1START
-- TAG-MRB-IDENTITY-START

MRB-Identity-r17 ::= INTEGER (1..512)

-- TAG-MRB-IDENTITY-STOP
-- ASN1STOP
```

– MsgA-ConfigCommon

The IE MsgA-ConfigCommon is used to configure the PRACH and PUSCH resource for transmission of MsgA in 2-step random access type procedure.

MsgA-ConfigCommon field descriptions

msqA-PUSCH-Config

-- ASN1STOP

Configuration of cell-specific MsgA PUSCH parameters which the UE uses for contention-based MsgA PUSCH transmission of this BWP. If the field is not configured for the selected UL BWP, the UE shall use the MsgA PUSCH configuration of initial UL BWP.

rach-ConfigCommonTwoStepRA

Configuration of cell specific random access parameters which the UE uses for contention based and contention free 2-step random access type procedure as well as for 2-step RA type contention based beam failure recovery in this BWP.

Conditional Presence	Explanation
InitialBWPConfig	The field is mandatory present when MsgA-ConfigCommon is configured for the initial uplink BWP, or when MsgA-
	ConfigCommon is configured for a non-initial uplink BWP and MsgA-ConfigCommon is not configured for the initial uplink
	BWP, otherwise the field is optionally present, Need S.

– MsgA-PUSCH-Config

The IE MsgA-PUSCH-Config is used to specify the PUSCH allocation for MsgA in 2-step random access type procedure.

MsgA-PUSCH-Config information element

```
-- ASN1START
-- TAG-MSGA-PUSCH-CONFIG-START
MsqA-PUSCH-Config-r16 ::=
                                               SEOUENCE {
    msgA-PUSCH-ResourceGroupA-r16
                                                   MsgA-PUSCH-Resource-r16
                                                                                                                  OPTIONAL, -- Cond InitialBWPConfig
   msgA-PUSCH-ResourceGroupB-r16
                                                   MsgA-PUSCH-Resource-r16
                                                                                                                  OPTIONAL, -- Cond GroupBConfigured
    msgA-TransformPrecoder-r16
                                                  ENUMERATED {enabled, disabled}
                                                                                                                  OPTIONAL, -- Need R
                                                                                                                  OPTIONAL, -- Need S
    msqA-DataScramblingIndex-r16
                                                   INTEGER (0..1023)
                                                   INTEGER (-1..6)
                                                                                                                  OPTIONAL -- Need R
    msgA-DeltaPreamble-r16
MsgA-PUSCH-Resource-r16 ::=
                                               SEQUENCE {
   msgA-MCS-r16
                                                   INTEGER (0..15),
    nrofSlotsMsgA-PUSCH-r16
                                                   INTEGER (1..4),
   nrofMsgA-PO-PerSlot-r16
                                                   ENUMERATED {one, two, three, six},
    msgA-PUSCH-TimeDomainOffset-r16
                                                   INTEGER (1..32),
```

```
msgA-PUSCH-TimeDomainAllocation-r16
                                                   INTEGER (1..maxNrofUL-Allocations)
                                                                                                                  OPTIONAL, -- Need S
    startSymbolAndLengthMsqA-PO-r16
                                                   INTEGER (0..127)
                                                                                                                  OPTIONAL. -- Need S
    mappingTvpeMsgA-PUSCH-r16
                                                   ENUMERATED {typeA, typeB}
                                                                                                                  OPTIONAL, -- Need S
    quardPeriodMsqA-PUSCH-r16
                                                   INTEGER (0..3)
                                                                                                                  OPTIONAL, -- Need R
    quardBandMsqA-PUSCH-r16
                                                   INTEGER (0..1),
                                                   INTEGER (0..maxNrofPhysicalResourceBlocks-1),
    frequencyStartMsqA-PUSCH-r16
    nrofPRBs-PerMsqA-PO-r16
                                                   INTEGER (1..32),
                                                   ENUMERATED {one, two, four, eight},
    nrofMsqA-PO-FDM-r16
    msgA-IntraSlotFrequencyHopping-r16
                                                   ENUMERATED {enabled}
                                                                                                                  OPTIONAL, -- Need R
    msqA-HoppingBits-r16
                                                   BIT STRING (SIZE(2))
                                                                                                                  OPTIONAL, -- Cond
FreqHopConfigured
    msgA-DMRS-Config-r16
                                                   MsgA-DMRS-Config-r16,
    nrofDMRS-Sequences-r16
                                                   INTEGER (1..2),
    msgA-Alpha-r16
                                                   ENUMERATED {alpha0, alpha04, alpha05, alpha06,
                                                               alpha07, alpha08, alpha09, alpha1}
                                                                                                                  OPTIONAL, -- Need S
    interlaceIndexFirstPO-MsqA-PUSCH-r16
                                                   INTEGER (1..10)
                                                                                                                  OPTIONAL, -- Need R
    nrofInterlacesPerMsqA-PO-r16
                                                   INTEGER (1..10)
                                                                                                                  OPTIONAL, -- Need R
MsgA-DMRS-Config-r16 ::=
                                               SEOUENCE {
                                                   ENUMERATED {pos0, pos1, pos3}
    msgA-DMRS-AdditionalPosition-r16
                                                                                                                  OPTIONAL, -- Need S
                                                   ENUMERATED {len2}
                                                                                                                  OPTIONAL, -- Need S
    msgA-MaxLength-r16
                                                                                                                  OPTIONAL, -- Need S
    msgA-PUSCH-DMRS-CDM-Group-r16
                                                   INTEGER (0..1)
    msqA-PUSCH-NrofPorts-r16
                                                   INTEGER (0..1)
                                                                                                                  OPTIONAL, -- Need S
    msqA-ScramblingID0-r16
                                                   INTEGER (0..65535)
                                                                                                                  OPTIONAL, -- Need S
    msqA-ScramblingID1-r16
                                                   INTEGER (0..65535)
                                                                                                                  OPTIONAL -- Need S
```

MsgA-PUSCH-Config field descriptions

msgA-DataScramblingIndex

-- TAG-MSGA-PUSCH-CONFIG-STOP

Identifier used to initiate data scrambling (c_init) for msgA PUSCH. If the field is absent the UE applies the value Physical cell ID (physCellID).

msqA-DeltaPreamble

-- ASN1STOP

Power offset of msgA PUSCH relative to the preamble received target power. Actual value = field value * 2 [dB] (see TS 38.213 [13], clause 7.1).

msqA-PUSCH-ResourceGroupA

MsgA PUSCH resources that the UE shall use when performing MsgA transmission using preambles group A. If field is not configured for the selected UL BWP, the UE shall use the MsgA PUSCH configuration for group A of initial UL BWP.

msgA-PUSCH-ResourceGroupB

MsgA PUSCH resources that the UE shall use when performing MsgA transmission using preambles group B.

msgA-TransformPrecoder

Enables or disables the transform precoder for MsgA transmission (see clause 6.1.3 of TS 38.214 [19]).

MsgA-PUSCH-Resource field descriptions

guardBandMsgA-PUSCH

PRB-level guard band between FDMed PUSCH occasions (see TS 38.213 [13], clause 8.1A). If interlaced PUSCH is configured, value 0 is applied.

guardPeriodMsgA-PUSCH

Guard period between PUSCH occasions in the unit of symbols (see TS 38.213 [13], clause 8.1A).

frequencyStartMsgA-PUSCH

Offset of lowest PUSCH occasion in frequency domain with respect to PRB 0 (see TS 38.213 [13], clause 8.1A).

interlaceIndexFirstPO-MsgA-PUSCH

Interlace index of the first PUSCH occasion in frequency domain if interlaced PUSCH is configured. For 30kHz SCS only the integers 1, 2, 3, 4, 5 are applicable (see TS 38.213 [13], clause 8.1A).

mappingTypeMsgA-PUSCH

PUSCH mapping type A or B. If the field is absent, the UE shall use the parameter msqA-PUSCH-TimeDomainAllocation (see TS 38.213 [13], clause 8.1A).

msgA-Alpha

Dedicated alpha value for MsgA PUSCH. If the field is absent, the UE shall use the value of msg3-Alpha if configured, else UE applies value 1 (see TS 38.213 [13], clause 7.1.1).

msgA-DMRS-Config

DMRS configuration for msgA PUSCH (see TS 38.213 [13], clause 8.1A and TS 38.214 [19] clause 6.2.2).

msgA-HoppingBits

Value of hopping bits to indicate which frequency offset to be used for second hop. See Table 8.3-1 in TS 38.213 [13].

msgA-IntraSlotFrequencyHopping

Intra-slot frequency hopping per PUSCH occasion (see TS 38.213 [13], clause 8.1A).

msgA-MCS

Indicates the MCS index for msgA PUSCH from the Table 6.1.4.1-1 for DFT-s-OFDM and Table 5.1.3.1-1 for CP-OFDM in TS 38.214 [19].

msgA-PUSCH-TimeDomainAllocation

Indicates a combination of start symbol and length and PUSCH mapping type from the TDRA table (*PUSCH-TimeDomainResourceAllocationList* if provided in *PUSCH-ConfigCommon*, or else the default Table 6.1.2.1.1-2 in 38.214 [19] is used if *pusch-TimeDomainAllocationList* is not provided in PUSCH-ConfigCommon). The parameter K2 in the table is not used for msgA PUSCH. The network configures one of *msgA-PUSCH-TimeDomainAllocation* and *startSymbolAndLengthMsgA-PO*, but not both. If the field is absent, the UE shall use the value of startSymbolAndLengthMsgA-PO.

msgA-PUSCH-TimeDomainOffset

A single time offset with respect to the start of each PRACH slot (with at least one valid RO), counted as the number of slots (based on the numerology of active UL BWP). See TS 38.213 [13], clause 8.1A.

nrofDMRS-Sequences

Number of DMRS sequences for MsgA PUSCH for CP-OFDM. In case of single PUSCH configuration or if the DMRS symbols of multiple configurations are not overlapped, if the DMRS resources configured in one PUSCH occasion is no larger than 8 (for *len2*) or 4 (for *len2*), then only DMRS port is configured.

nrofInterlacesPerMsqA-PO

Number of consecutive interlaces per PUSCH occasion if interlaced PUSCH is configured. For 30kHz SCS only the integers 1, 2, 3, 4, 5 are applicable (see TS 38.213 [13], clause 8.1A).

nrofMsgA-PO-FDM

The number of msgA PUSCH occasions FDMed in one time instance (see TS 38.213 [13], clause 8.1A).

nrofMsqA-PO-PerSlot

Number of time domain PUSCH occasions in each slot. PUSCH occasions including guard period are contiguous in time domain within a slot (see TS 38.213 [13], clause 8.1A).

nrofPRBs-PerMsqA-PO

Number of PRBs per PUSCH occasion (see TS 38.213 [13], clause 8.1A).

nrofSlotsMsgA-PUSCH

Number of slots (in active UL BWP numerology) containing one or multiple PUSCH occasions, each slot has the same time domain resource allocation (see TS 38.213 [13], clause 8.1A).

startSymbolAndLengthMsgA-PO

An index giving valid combinations of start symbol, length and mapping type as start and length indicator (SLIV) for the first msgA PUSCH occasion, for RRC_CONNECTED UEs in non-initial BWP as described in TS 38.214 [19] clause 6.1.2. The network configures the field so that the allocation does not cross the slot boundary. The number of occupied symbols excludes the guard period. If the field is absent, the UE shall use the value in *msgA-PUSCH-TimeDomainAllocation* (see TS 38.213 [13], clause 8.1A). The network configures one of *msgA-PUSCH-TimeDomainAllocation* and *startSymbolAndLengthMsgA-PO*, but not both. If the field is absent, the UE shall use the value of *msgA-PUSCH-TimeDomainAllocation*.

MsgA-DMRS-Config field descriptions

msgA-DMRS-AdditionalPosition

Indicates the position for additional DM-RS. If the field is absent, the UE applies value pos2.

msgA-MaxLength

indicates single-symbol or double-symbol DMRS. If the field is absent, the UE applies value len1.

msgA-PUSCH-DMRS-CDM-Group

1-bit indication of indices of CDM group(s). If the field is absent, then both CDM groups are used.

msgA-PUSCH-NrofPorts

0 indicates 1 port per CDM group, 1 indicates 2 ports per CDM group. If the field is absent then 4 ports per CDM group are used (see TS 38.213 [13], clause 8.1A).

msqA-ScramblingID0

UL DMRS scrambling initialization for CP-OFDM. If the field is absent the UE applies the value Physical cell ID (physCellID).

msgA-ScramblingID1

UL DMRS scrambling initialization for CP-OFDM. If the field is absent the UE applies the value Physical cell ID (physCellID).

Conditional Presence	Explanation
FreqHopConfigured	This field is mandatory present when the field <i>msgA-IntraSlotFrequencyHopping</i> is configured. Otherwise, the field is absent.
GroupBConfigured	The field is mandatory present if groupB-ConfiguredTwoStepRA is configured in RACH-ConfigCommonTwoStepRA,
	otherwise the field is absent.
InitialBWPConfig	The field is mandatory present when MsgA-ConfigCommon is configured for the initial uplink BWP, or when MsgA-
	ConfigCommon is configured for a non-initial uplink BWP and MsgA-ConfigCommon is not configured for the initial uplink
	BWP, otherwise the field is optionally present, Need S.

– MultiFrequencyBandListNR

The IE *MultiFrequencyBandListNR* is used to configure a list of one or multiple NR frequency bands.

MultiFrequencyBandListNR information element

```
-- ASN1START
```

MultiFrequencyBandListNR ::= SEQUENCE (SIZE (1..maxNrofMultiBands)) OF FreqBandIndicatorNR

⁻⁻ TAG-MULTIFREQUENCYBANDLISTNR-START

```
-- TAG-MULTIFREQUENCYBANDLISTNR-STOP
-- ASN1STOP
```

– MultiFrequencyBandListNR-SIB

The IE *MultiFrequencyBandListNR-SIB* indicates the list of frequency bands, for which cell (re-)selection parameters are common, and a list of *additionalPmax* and *additionalSpectrumEmission*.

MultiFrequencyBandListNR-SIB information element

NR-MultiBandInfo field descriptions

freqBandIndicatorNR

Provides an NR frequency band number as defined in TS 38.101-1 [15] and TS 38.101-2 [39], table 5.2-1.

nr-NS-PmaxList

Provides a list of additionalPmax and additionalSpectrumEmission (see TS 38.101-1 [15] table 6.2.3.1-1A, and TS 38.101-2 [39], table 6.2.3.1-2). This field is ignored by IAB-MT, the IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63].

Conditional Presence	Explanation
OptULNotSIB2	The field is absent for SIB2 and is mandatory present in SIB4 and frequencyInfoDL-SIB. Otherwise, if the field is absent in frequencyInfoUL-
	SIB in UplinkConfigCommonSIB, the UE will use the frequency band indicated in frequencyInfoDL-SIB in DownlinkConfigCommonSIB.

MUSIM-GapConfig

The IE MUSIM-GapConfig specifies the MUSIM gap configuration and controls setup/release of MUSIM gaps.

MUSIM-GapConfig information element

```
-- ASN1START
-- TAG-MUSIM-GAPCONFIG-START
```

```
MUSIM-GapConfig-r17 ::=

musim-GapToReleaseList-r17 SEQUENCE (SIZE (1..3)) OF MUSIM-GapId-r17 OPTIONAL, -- Need N
musim-GapToAddModList-r17 SEQUENCE (SIZE (1..3)) OF MUSIM-Gap-r17 OPTIONAL, -- Need N
musim-AperiodicGap-r17 MUSIM-GapInfo-r17 OPTIONAL, -- Need N

...

MUSIM-GapInfo-r17 OPTIONAL, -- Need N

MUSIM-GapInfo-r17 OPTIONAL, -- Need N

MUSIM-GapInfo-r17 MUSIM-GapId-r17,
musim-GapId-r17 MUSIM-GapInfo-r17

}

-- TAG-MUSIM-GAPCONFIG-STOP
-- ASN1STOP
```

MUSIM-GapConfig field descriptions

musim-AperiodicGap

Indicates the MUSIM aperiodic gap as specified in TS 38.133 [14] clause 9.1.10.

musim-GapInfo

Indicates the values for *musim-GapLength*, *musim-GapRepetitionAndOffset*, *starting-SFN*, and *startingSubframe*. If UE indicates the *musim-Starting-SFN-AndSubframe* when requesting aperiodic gap the network can only configure the aperiodic gap with the same start point or no aperiodic gap. If the field *musim-Starting-SFN-AndSubframe* is absent for aperiodic gap, network can configure any timing as the starting point for aperiodic gap or configure no aperiodic gap. When network provides periodic gap, network always signals the *musim-GapLength* and *musim-GapRepetitionAndOffset* as indicated by the UE's preferred MUSIM gap configuration.

musim-GapToAddModList

List of MUSIM periodic gap patterns to add or modify.

musim-GapToReleaseList

List of MUSIM periodic gap patterns to release.

- MUSIM-Gapld

The IE MUSIM-GapId is used to identify UE periodic MUSIM gap(s) to add, modify or release.

MUSIM-GapId information element

```
-- ASN1START
-- TAG-MUSIM-GAPID-START

MUSIM-GapId-r17 ::= INTEGER (0..2)

-- TAG-MUSIM-GAPID-STOP
-- ASN1STOP
```

MUSIM-GapInfo

The IE MUSIM-GapInfo is used to indicate MUSIM gap parameters.

MUSIM-GapInfo information element

```
-- ASN1START
-- TAG-MUSIM-GAPINFO-START
MUSIM-GapInfo-r17 ::= SEOUENCE {
   musim-Starting-SFN-AndSubframe-r17 MUSIM-Starting-SFN-AndSubframe-r17
                                                                         OPTIONAL, -- Cond aperiodic
   musim-GapLength-r17 ENUMERATED {ms3, ms4, ms6, ms10, ms20}
                                                                         OPTIONAL, -- Cond gapSetup
   ms20-r17
                                     INTEGER (0..19),
      ms40-r17
                                     INTEGER (0..39),
      ms80-r17
                                    INTEGER (0..79),
                                    INTEGER (0..159),
      ms160-r17
      ms320-r17
                                    INTEGER (0..319),
      ms640-r17
                                     INTEGER (0..639),
      ms1280-r17
                                     INTEGER (0..1279),
      ms2560-r17
                                     INTEGER (0..2559),
      ms5120-r17
                                     INTEGER (0..5119),
                                                                         OPTIONAL -- Cond periodic
MUSIM-Starting-SFN-AndSubframe-r17 ::= SEQUENCE {
   starting-SFN-r17 INTEGER (0..1023),
   startingSubframe-r17 INTEGER (0..9)
-- TAG-MUSIM-GAPINFO-STOP
-- ASN1STOP
```

MUSIM-GapInfo field descriptions

musim-GapLength

Indicates the length of the UE's MUSIM gap as specified in TS 38.133 [14] clause 9.1.10. This field is mandatory present for both periodic gap and aperiodic gap preference indication.

musim-GapRepetitionAndOffset

Indicates the gap repetition period in ms and gap offset in number of subframes for the periodic MUSIM gap as specified in TS 38.133 [14] clause 9.1.10. This field is mandatory present for the periodic MUSIM gap indication.

musim-Starting-SFN-AndSubframe

Indicates gap starting position for the aperiodic MUSIM gap. This field is optionally present for the aperiodic MUSIM gap indication.

starting-SFN

Indicates gap starting SFN number for the aperiodic MUSIM gap preference.

startingSubframe

Indicates gap starting subframe number for the aperiodic MUSIM gap.

Conditional Presence	Explanation
aperiodic	This field is mandatory present in case of aperiodic MUSIM gap configuration. Otherwise it is absent.
gapSetup	The field is mandatory present upon configuration of a new MUSIM gap. The field is optionally present, Need M, otherwise.
periodic	This field is mandatory present in case of periodic MUSIM gap configuration. Otherwise it is absent.

NeedForGapsConfigNR

The IE NeedForGapsConfigNR contains configuration related to the reporting of measurement gap requirement information.

NeedForGapsConfigNR information element

```
-- ASN1START
-- TAG-NeedForGapsConfigNR-START

NeedForGapsConfigNR-r16 ::= SEQUENCE {
    requestedTargetBandFilterNR-r16 SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR OPTIONAL -- Need R
}

-- TAG-NeedForGapsConfigNR-STOP
-- ASN1STOP
```

NeedForGapsConfigNR field descriptions

requestedTargetBandFilterNR

Indicates the target NR bands that the UE is requested to report the gap requirement information.

NeedForGapsInfoNR

The IE *NeedForGapsInfoNR* indicates whether measurement gap is required for the UE to perform SSB based measurements on an NR target band while NR-DC or NE-DC is not configured.

NeedForGapsInfoNR information element

```
-- ASN1START
-- TAG-NeedForGapsInfoNR-START

NeedForGapsInfoNR-r16 ::= SEQUENCE {
    intraFreq-needForGap-r16 NeedForGapsIntraFreqList-r16,
    interFreq-needForGap-r16 NeedForGapsBandListNR-r16
}

NeedForGapsIntraFreqList-r16 ::= SEQUENCE (SIZE (1.. maxNrofServingCells)) OF NeedForGapsIntraFreq-r16
NeedForGapsBandListNR-r16 ::= SEQUENCE (SIZE (1..maxBands)) OF NeedForGapsNR-r16
NeedForGapsIntraFreq-r16 ::= SEQUENCE {
```

```
servCellId-r16
    gapIndicationIntra-r16

NeedForGapsNR-r16 ::=
    bandNR-r16
    gapIndication-r16

PreqBandIndicatorNR,
    gapIndication-r16

TAG-NeedForGapsInfoNR-STOP
-- ASN1STOP
ServCellIndex,
ENUMERATED {gap, no-gap}

SEQUENCE {
    FreqBandIndicatorNR,
    ENUMERATED {gap, no-gap}
}
```

NeedForGapsInfoNR field descriptions

intraFreq-needForGap

Indicates the measurement gap requirement information for NR intra-frequency measurement.

interFreg-needForGap

Indicates the measurement gap requirement information for NR inter-frequency measurement.

NeedForGapsIntraFreq field descriptions

servCellId

Indicates the serving cell which contains the target SSB (associated with the initial DL BWP) to be measured.

gaplndicationIntra

Indicates whether measurement gap is required for the UE to perform intra-frequency SSB based measurements on the concerned serving cell. Value *gap* indicates that a measurement gap is needed if any of the UE configured BWPs do not contain the frequency domain resources of the SSB associated to the initial DL BWP. Value *no-gap* indicates a measurement gap is not needed to measure the SSB associated to the initial DL BWP for all configured BWPs, no matter the SSB is within the configured BWP or not.

NeedForGapsNR field descriptions

bandNR

Indicates the NR target band to be measured.

gapIndication

Indicates whether measurement gap is required for the UE to perform SSB based measurements on the concerned NR target band while NR-DC or NE-DC is not configured. The UE determines this information based on the resultant configuration of the *RRCReconfiguration* or *RRCResume* message that triggers this response. Value *gap* indicates that a measurement gap is needed, value *no-gap* indicates a measurement gap is not needed.

NeedForGapNCSG-ConfigEUTRA

The IE NeedForGapNCSG-ConfigEUTRA contains configuration related to the reporting of measurement gap and NCSG requirement information.

NeedForGapNCSG-ConfigEUTRA information element

```
-- ASN1START
```

⁻⁻ TAG-NeedForGapNCSG-ConfigEUTRA-START

```
NeedForGapNCSG-ConfigEUTRA-r17 ::= SEQUENCE {
    requestedTargetBandFilterNCSG-EUTRA-r17 SEQUENCE (SIZE (1..maxBandsEUTRA)) OF FreqBandIndicatorEUTRA OPTIONAL -- Need R
}

-- TAG-NeedForGapNCSG-ConfigEUTRA-STOP
-- ASN1STOP
```

NeedForGapNCSG-ConfigEUTRA field descriptions

requestedTargetBandFilterNCSG-EUTRA

Indicates the target E-UTRA bands that the UE is requested to report the measurement gap and NCSG requirement information.

NeedForGapNCSG-ConfigNR

The IE NeedForGapNCSG-ConfigNR contains configuration related to the reporting of measurement gap and NCSG requirement information.

NeedForGapNCSG-ConfigNR information element

```
-- ASN1START
-- TAG-NEEDFORGAPNCSG-CONFIGNR-START

NeedForGapNCSG-ConfigNR-r17 ::= SEQUENCE {
    requestedTargetBandFilterNCSG-NR-r17 SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR OPTIONAL -- Need R
}

-- TAG-NEEDFORGAPNCSG-CONFIGNR-STOP
-- ASN1STOP
```

NeedForGapNCSG-ConfigNR field descriptions

requestedTargetBandFilterNCSG-NR

Indicates the target NR bands that the UE is requested to report the measurement gap and NCSG requirement information.

NeedForGapNCSG-InfoEUTRA

The IE *NeedForGapNCSG-InfoEUTRA* indicates whether measurement gap or NCSG is required for the UE to perform measurements on an E-UTRA target band while NR-DC or NE-DC is not configured.

NeedForGapNCSG-InfoEUTRA information element

NeedForGapNCSG-InfoEUTRA field descriptions

needForNCSG-EUTRA

Indicates the measurement gap and NCSG requirement information for E-UTRA measurement.

NeedForNCSG-EUTRA field descriptions

bandEUTRA

Indicates the E-UTRA target band to be measured.

gapIndication

Indicates whether measurement gap or NCSG is required for the UE to perform measurements on the concerned E-UTRA target band while NR-DC or NE-DC is not configured. The UE determines this information based on the resultant configuration of the *RRCReconfiguration* message or *RRCResume* message that triggers this response. Value *gap* indicates that a measurement gap is needed, value *ncsg* indicates that NCSG is needed, value *nogap-noncsg* indicates neither a measurement gap nor a NCSG is needed.

NeedForGapNCSG-InfoNR

The IE *NeedForGapNCSG-InfoNR* indicates whether measurement gap or NCSG is required for the UE to perform SSB based measurements on an NR target band while NR-DC or NE-DC is not configured.

NeedForGapNCSG-InfoNR information element

```
-- ASN1START
-- TAG-NEEDFORGAPNCSG-INFONR-START
NeedForGapNCSG-InfoNR-r17 ::=
                                SEQUENCE {
   intraFreq-needForNCSG-r17
                                    NeedForNCSG-IntraFreqList-r17,
    interFreq-needForNCSG-r17
                                    NeedForNCSG-BandListNR-r17
NeedForNCSG-IntraFreqList-r17 ::= SEQUENCE (SIZE (1.. maxNrofServingCells)) OF NeedForNCSG-IntraFreq-r17
NeedForNCSG-BandListNR-r17 ::=
                                SEQUENCE (SIZE (1..maxBands)) OF NeedForNCSG-NR-r17
NeedForNCSG-IntraFreg-r17 ::= SEOUENCE {
   servCellId-r17
                                   ServCellIndex,
   gapIndicationIntra-r17
                                   ENUMERATED {gap, ncsg, nogap-noncsg}
```

NeedForGapNCSG-InfoNR field descriptions

intraFreq-needForNCSG

Indicates the measurement gap and NCSG requirement information for NR intra-frequency measurement.

interFreq-needForNCSG

Indicates the measurement gap and NCSG requirement information for NR inter-frequency measurement.

NeedForNCSG-IntraFreg field descriptions

servCellId

Indicates the serving cell which contains the target SSB (associated with the initial DL BWP) to be measured.

gapIndicationIntra

Indicates whether measurement gap or NCSG is required for the UE to perform intra-frequency SSB based measurements on the concerned serving cell. Value *gap* indicates that a measurement gap is needed if any of the UE configured BWPs do not contain the frequency domain resources of the SSB associated to the initial DL BWP. Value *ncsg* indicates that a NCSG is needed if any of the UE configured BWPs do not contain the frequency domain resources of the SSB associated to the initial DL BWP. Value *nogap-noncsg* indicates that neither a measurement gap nor a NCSG is needed to measure the SSB associated to the initial DL BWP for all configured BWPs, no matter the SSB is within the configured BWP or not.

NeedForNCSG-NR field descriptions

bandNR

Indicates the NR target band to be measured.

gapIndication

Indicates whether measurement gap or NCSG is required for the UE to perform SSB based measurements on the concerned NR target band while NR-DC or NE-DC is not configured. The UE determines this information based on the resultant configuration of the *RRCReconfiguration* or *RRCResume* message that triggers this response. Value *gap* indicates that a measurement gap is needed, value *ncsg* indicates that a NCSG is needed, and value *nogap-noncsg* indicates neither a measurement gap nor a NCSG is needed.

NextHopChainingCount

The IE NextHopChainingCount is used to update the K_{gNB} key and corresponds to parameter NCC: See TS 33.501 [11].

NextHopChainingCount information element

```
-- ASN1START
-- TAG-NEXTHOPCHAININGCOUNT-START

NextHopChainingCount ::= INTEGER (0..7)
```

```
-- TAG-NEXTHOPCHAININGCOUNT-STOP
-- ASN1STOP
```

– NG-5G-S-TMSI

The IE *NG-5G-S-TMSI* contains a 5G S-Temporary Mobile Subscription Identifier (5G-S-TMSI), a temporary UE identity provided by the 5GC which uniquely identifies the UE within the tracking area, see TS 23.003 [21].

NG-5G-S-TMSI information element

```
-- ASN1START
-- TAG-NG-5G-S-TMSI-START

NG-5G-S-TMSI ::= BIT STRING (SIZE (48))

-- TAG-NG-5G-S-TMSI-STOP
-- ASN1STOP
```

NonCellDefiningSSB

The IE NonCellDefiningSSB is used to configure a NCD-SSB to be used while the UE operates in a RedCap-specific initial BWP or dedicated BWP.

NonCellDefiningSSB information element

NonCellDefiningSSB field descriptions

absoluteFrequencySSB

Frequency of the NCD-SSB. The network configures this field so that the SSB is within the bandwidth of the BWP configured in BWP-DownlinkCommon.

ssb-Periodicity

The periodicity of this NCD-SSB. The network configures only periodicities that are larger than the periodicity of serving cell's CD-SSB. If the field is absent, the UE applies the SSB periodicity of the CD-SSB (ssb-periodicityServingCell configured in ServingCellConfigCommon).

ssb-TimeOffset

The time offset between CD-SSB of the serving cell and this NCD-SSB. Value *ms5* means the first burst of NCD-SSB is transmitted 5ms later than the first burst of CD-SSB transmitted after the first symbol of SFN=0 of the serving cell, value *ms10* means the first burst of NCD-SSB is transmitted 10ms later than the first burst of CD-SSB transmitted after the first symbol in SFN=0 of the serving cell, and so on. If the field is absent, RedCap UE considers that the time offset between the first burst of CD-SSB transmitted in the serving cell and the first burst of this NCD-SSB transmitted is zero.

- NPN-Identity

The IE NPN-Identity includes either a list of CAG-IDs or a list of NIDs per PLMN Identity. Further information regarding how to set the IE is specified in TS 23.003 [21].

NPN-Identity information element

```
-- ASN1START
-- TAG-NPN-IDENTITY-START
                               CHOICE {
NPN-Identity-r16 ::=
                                   SEQUENCE {
   pni-npn-r16
       plmn-Identity-r16
                                       PLMN-Identity,
       cag-IdentityList-r16
                                       SEOUENCE (SIZE (1..maxNPN-r16)) OF CAG-IdentityInfo-r16
    snpn-r16
                                   SEOUENCE {
       plmn-Identity-r16
                                       PLMN-Identity,
       nid-List-r16
                                       SEQUENCE (SIZE (1..maxNPN-r16)) OF NID-r16
CAG-IdentityInfo-r16 ::=
                               SEQUENCE {
    cag-Identity-r16
                                   BIT STRING (SIZE (32)),
   manualCAGselectionAllowed-r16 ENUMERATED {true}
                                                                            OPTIONAL -- Need R
NID-r16 ::=
                               BIT STRING (SIZE (44))
-- TAG-NPN-IDENTITY-STOP
-- ASN1STOP
```

NPN-Identity field descriptions

cag-Identity

A CAG-ID as specified in TS 23.003 [21]. The PLMN ID and a CAG ID in the NPN-Identity identifies a PNI-NPN.

cag-IdentityList

The cag-IdentityList contains one or more CAG IDs. All CAG IDs associated to the same PLMN ID are listed in the same cag-IdentityList entry.

manualCAGselectionAllowed

The manualCAGselectionAllowed indicates that the CAG ID can be selected manually even if it is outside the UE's allowed CAG list.

NID

A NID as specified in TS 23.003 [21]. The PLMN ID and a NID in the NPN-Identity identifies a SNPN.

nid-List

The nid-List contains one or more NID.

NPN-IdentityInfoList

The IE NPN-IdentityInfoList includes a list of NPN identity information.

NPN-IdentityInfoList information element

```
-- ASN1START
-- TAG-NPN-IDENTITYINFOLIST-START
                             SEQUENCE (SIZE (1..maxNPN-r16)) OF NPN-IdentityInfo-r16
NPN-IdentityInfoList-r16 ::=
NPN-IdentityInfo-r16 ::=
                             SEQUENCE {
   npn-IdentityList-r16
                                 SEQUENCE (SIZE (1..maxNPN-r16)) OF NPN-Identity-r16,
   trackingAreaCode-r16
                                 TrackingAreaCode,
   ranac-r16
                                 RAN-AreaCode
                                                                                       OPTIONAL,
                                                                                                     -- Need R
   cellIdentity-r16
                                 CellIdentity,
   iab-Support-r16
                                 ENUMERATED {true}
                                                                                       OPTIONAL,
                                                                                                     -- Need S
   . . . ,
   [ [
   gNB-ID-Length-r17
                                 INTEGER (22..32)
                                                                                       OPTIONAL
                                                                                                     -- Need R
   11
-- TAG-NPN-IDENTITYINFOLIST-STOP
-- ASN1STOP
```

NPN-IdentityInfoList field descriptions

iab-Support

This field combines both the support of IAB and the cell status for IAB. If the field is present, the cell supports IAB and the cell is also considered as a candidate for cell (re)selection for IAB-nodes; if the field is absent, the cell does not support IAB and/or the cell is barred for IAB-node.

gNB-ID-Length

Indicates the length of the gNB ID out of the 36-bit long cellidentity.

NPN-IdentityInfo

The NPN-IdentityInfo contains one or more NPN identities and additional information associated with those NPNs. Only the same type of NPNs (either SNPNs or PNI-NPNs) can be listed in a NPN-IdentityInfo element.

npn-IdentityList

The *npn-IdentityList* contains one or more NPN Identity elements.

trackingAreaCode

Indicates the Tracking Area Code to which the cell indicated by cellIdentity field belongs.

ranac

Indicates the RAN Area Code to which the cell indicated by cellIdentity field belongs.

cellReservedForOperatorUse

Indicates whether the cell is reserved for operator use (for the NPN(s) identified in the *npn-IdentityList*) as defined in TS 38.304 [20]. This field is ignored by NPN capable IAB-MT.

NR-DL-PRS-PDC-Info

The IE NR-DL-PRS-PDC-Info defines downlink PRS configuration for PDC.

NR-DL-PRS-PDC-Info information element

```
-- ASN1START
-- TAG-NR-DL-PRS-PDC-INFO-START
NR-DL-PRS-PDC-Info-r17 ::= SEOUENCE {
   nr-DL-PRS-PDC-ResourceSet-r17
                                       NR-DL-PRS-PDC-ResourceSet-r17
                                                                                     OPTIONAL, -- Need R
NR-DL-PRS-PDC-ResourceSet-r17 ::= SEOUENCE {
   periodicityAndOffset-r17 NR-DL-PRS-Periodicity-and-ResourceSetSlotOffset-r17,
   numSymbols-r17 ENUMERATED {n2, n4, n6, n12, spare4, spare3, spare2, spare1},
   dl-PRS-ResourceBandwidth-r17 INTEGER (1..63),
   dl-PRS-StartPRB-r17
                                    INTEGER (0..2176),
   resourceList-r17 SEQUENCE (SIZE (1..maxNrofPRS-ResourcesPerSet-r17)) OF NR-DL-PRS-Resource-r17,
   repFactorAndTimeGap-r17 RepFactorAndTimeGap-r17
                                                                                     OPTIONAL. -- Need S
NR-DL-PRS-Periodicity-and-ResourceSetSlotOffset-r17 ::= CHOICE {
   scs15-r17
                  CHOICE {
                      n4-r17
                                            INTEGER (0..3),
                      n5-r17
                                            INTEGER (0..4),
                      n8-r17
                                            INTEGER (0..7),
```

```
INTEGER (0..9),
                    n10-r17
                    n16-r17
                                             INTEGER (0..15),
                    n20-r17
                                             INTEGER (0..19),
                    n32-r17
                                             INTEGER (0..31),
                    n40-r17
                                             INTEGER (0..39),
                    n64-r17
                                             INTEGER (0..63),
                    n80-r17
                                             INTEGER (0..79),
                    n160-r17
                                             INTEGER (0..159),
                    n320-r17
                                             INTEGER (0..319),
                                             INTEGER (0..639),
                    n640-r17
                                             INTEGER (0..1279),
                    n1280-r17
                    n2560-r17
                                             INTEGER (0..2559),
                    n5120-r17
                                             INTEGER (0..5119),
                    n10240-r17
                                             INTEGER (0..10239),
                    . . .
},
scs30-r17
                CHOICE {
                    n8-r17
                                             INTEGER (0..7),
                    n10-r17
                                             INTEGER (0..9),
                    n16-r17
                                             INTEGER (0..15),
                    n20-r17
                                             INTEGER (0..19),
                    n32-r17
                                             INTEGER (0..31),
                    n40-r17
                                             INTEGER (0..39),
                    n64-r17
                                             INTEGER (0..63),
                    n80-r17
                                             INTEGER (0..79),
                    n128-r17
                                             INTEGER (0..127),
                    n160-r17
                                             INTEGER (0..159),
                    n320-r17
                                             INTEGER (0..319),
                    n640-r17
                                             INTEGER (0..639),
                    n1280-r17
                                             INTEGER (0..1279),
                    n2560-r17
                                             INTEGER (0..2559),
                                             INTEGER (0..5119),
                    n5120-r17
                    n10240-r17
                                             INTEGER (0..10239),
                                             INTEGER (0..20479),
                    n20480-r17
                    . . .
scs60-r17
                CHOICE {
                    n16-r17
                                             INTEGER (0..15),
                    n20-r17
                                             INTEGER (0..19),
                    n32-r17
                                             INTEGER (0..31),
                    n40-r17
                                             INTEGER (0..39),
                    n64-r17
                                             INTEGER (0..63),
                    n80-r17
                                             INTEGER (0..79),
                    n128-r17
                                             INTEGER (0..127),
                    n160-r17
                                             INTEGER (0..159),
                    n256-r17
                                             INTEGER (0..255),
                    n320-r17
                                             INTEGER (0..319),
                                             INTEGER (0..639),
                    n640-r17
                    n1280-r17
                                             INTEGER (0..1279),
                    n2560-r17
                                             INTEGER (0..2559),
                    n5120-r17
                                             INTEGER (0..5119),
                    n10240-r17
                                             INTEGER (0..10239),
                    n20480-r17
                                             INTEGER (0..20479),
                    n40960-r17
                                             INTEGER (0..40959),
```

```
scs120-r17
                    CHOICE {
                        n32-r17
                                                 INTEGER (0..31),
                        n40-r17
                                                 INTEGER (0..39),
                        n64-r17
                                                 INTEGER (0..63),
                        n80-r17
                                                 INTEGER (0..79),
                                                 INTEGER (0..127),
                        n128-r17
                        n160-r17
                                                 INTEGER (0..159),
                        n256-r17
                                                 INTEGER (0..255),
                        n320-r17
                                                 INTEGER (0..319),
                        n512-r17
                                                 INTEGER (0..511),
                        n640-r17
                                                 INTEGER (0..639),
                        n1280-r17
                                                 INTEGER (0..1279),
                        n2560-r17
                                                 INTEGER (0..2559),
                        n5120-r17
                                                 INTEGER (0..5119),
                                                 INTEGER (0..10239),
                        n10240-r17
                        n20480-r17
                                                 INTEGER (0..20479),
                        n40960-r17
                                                 INTEGER (0..40959),
                        n81920-r17
                                                 INTEGER (0..81919),
                        . . .
    },
NR-DL-PRS-Resource-r17 ::= SEQUENCE {
    nr-DL-PRS-ResourceID-r17
                                         NR-DL-PRS-ResourceID-r17,
    dl-PRS-SequenceID-r17
                                         INTEGER (0..4095),
    dl-PRS-CombSizeN-AndReOffset-r17
                                         CHOICE {
            n2-r17
                                             INTEGER (0..1),
                                             INTEGER (0..3),
            n4-r17
            n6-r17
                                             INTEGER (0..5),
            n12-r17
                                             INTEGER (0..11),
    dl-PRS-ResourceSlotOffset-r17
                                         INTEGER (0..maxNrofPRS-ResourceOffsetValue-1-r17),
    dl-PRS-ResourceSymbolOffset-r17
                                         INTEGER (0..12),
                                         DL-PRS-OCL-Info-r17
                                                                                      OPTIONAL, -- Need N
    dl-PRS-OCL-Info-r17
DL-PRS-OCL-Info-r17 ::= CHOICE {
    ssb-r17
                                 SEQUENCE {
        ssb-Index-r17
                                         INTEGER (0..63),
                                         ENUMERATED {typeC, typeD, typeC-plus-typeD},
        rs-Type-r17
    dl-PRS-r17
                                 SEQUENCE {
        qcl-DL-PRS-ResourceID-r17
                                         NR-DL-PRS-ResourceID-r17,
    . . .
```

NR-DL-PRS-PDC-ResourceSet field descriptions

dI-PRS-ResourceBandwidth

This field specifies the number of PRBs allocated for all the DL-PRS Resource (allocated DL-PRS bandwidth) in multiples of 4 PRBs in this resource set. All DL-PRS Resources of the DL-PRS-PDC Resource Set have the same bandwidth. Integer value 1 corresponds to 24 PRBs, value 2 corresponds to 28 PRBs, value 3 corresponds to 32 PRBs and so on.

dl-PRS-StartPRB

This field specifies the start PRB index defined as offset with respect to subcarrier 0 in common resource block 0 for the DL-PRS Resource. All DL-PRS Resources of the DL-PRS-PDC Resource Set have the same value of dl-PRS-StartPRB.

numSymbols

This field specifies the number of symbols per DL-PRS Resource within a slot.

periodicityAndOffset

This field specifies the periodicity of DL-PRS allocation in slots and the slot offset with respect to SFN #0 slot #0 in the PCell where the DL-PRS-PDC Resource Set is configured (i.e., slot where the first DL-PRS Resource of DL-PRS-PDC Resource Set occurs).

repFactorAndTimeGap

If this field is absent, the value for repetitionFactor is 1 (i.e., no resource repetition).

RepFactorAndTimeGap field descriptions

repetitionFactor

This field specifies how many times each DL-PRS Resource is repeated for a single instance of the DL-PRS Resource Set. It is applied to all resources of the DL-PRS Resource Set. Enumerated values n2, n4, n6, n8, n16, n32 correspond to 2, 4, 6, 8, 16, 32 resource repetitions, respectively.

timeGap

This field specifies the offset in units of slots between two repeated instances of a DL-PRS Resource corresponding to the same DL-PRS Resource ID within a single instance of the DL-PRS Resource Set. The time duration spanned by one DL-PRS Resource Set containing repeated DL-PRS Resources should not exceed the periodicity configured by periodicityAndOffset.

NR-NS-PmaxList

The IE NR-NS-PmaxList is used to configure a list of additionalPmax and additionalSpectrumEmission, as defined in TS 38.101-1 [15], table 6.2.3.1-1A, and TS 38.101-2 [39], table 6.2.3.1-2, for a given frequency band.

NR-NS-PmaxList information element

```
-- ASN1START
```

⁻⁻ TAG-NR-NS-PMAXLIST-START

```
NR-NS-PmaxList ::= SEQUENCE (SIZE (1..maxNR-NS-Pmax)) OF NR-NS-PmaxValue

NR-NS-PmaxValue ::= SEQUENCE {
   additionalPmax P-Max OPTIONAL, -- Need N AdditionalSpectrumEmission
}

-- TAG-NR-NS-PMAXLIST-STOP -- ASN1STOP
```

– NSAG-ID

The IE NSAG-ID is used to identify an NSAG (TS 23.501 [32]) for slice-based cell reselection or slice-based random access.

NSAG-ID information element

```
-- ASN1START
-- TAG-NSAG-ID-START

NSAG-ID-r17 ::= BIT STRING (SIZE (8))

-- TAG-NSAG-ID-STOP
-- ASN1STOP
```

NSAG-IdentityInfo

The IE NSAG-IdentityInfo is used to identify an NSAG (TS 23.501 [32]) for slice-based cell reselection.

NSAG-IdentityInfo information element

NSAG-IdentityInfo field descriptions

trackingAreaCode

If absent, UE assumes the trackingAreaCode of the serving cell.

- NTN-Config

-- TAG-NTN-CONFIG-STOP

-- ASN1STOP

The IE NTN-Config provides parameters needed for the UE to access NR via NTN access.

NTN-Config information element

```
-- ASN1START
-- TAG-NTN-CONFIG-START
NTN-Config-r17 ::=
                               SEOUENCE {
    epochTime-r17
                                   EpochTime-r17
                                                                                                            OPTIONAL, -- Need R
    ntn-UlSyncValidityDuration-r17 ENUMERATED{ s5, s10, s15, s20, s25, s30, s35,
                                              s40, s45, s50, s55, s60, s120, s180, s240, s900}
                                                                                                            OPTIONAL, -- Cond SIB19
    cellSpecificKoffset-r17
                                   INTEGER(1..1023)
                                                                                                            OPTIONAL, -- Need R
                                                                                                            OPTIONAL, -- Need R
    kmac-r17
                                   INTEGER(1..512)
    ta-Info-r17
                                   TA-Info-r17
                                                                                                            OPTIONAL, -- Need R
    ntn-PolarizationDL-r17
                                  ENUMERATED {rhcp,lhcp,linear}
                                                                                                            OPTIONAL, -- Need R
    ntn-PolarizationUL-r17
                                   ENUMERATED {rhcp,lhcp,linear}
                                                                                                            OPTIONAL, -- Need R
                                   EphemerisInfo-r17
                                                                                                            OPTIONAL, -- Need R
    ephemerisInfo-r17
                                   ENUMERATED {enabled}
                                                                                                            OPTIONAL, -- Need R
    ta-Report-r17
EpochTime-r17 ::=
                               SEQUENCE {
    sfn-r17
                                   INTEGER(0..1023),
    subFrameNR-r17
                                   INTEGER(0..9)
TA-Info-r17 ::=
                                SEQUENCE {
    ta-Common-r17
                                   INTEGER(0..66485757),
    ta-CommonDrift-r17
                                   INTEGER (-257303..257303)
                                                                                                            OPTIONAL, -- Need R
    ta-CommonDriftVariant-r17
                                   INTEGER(0..28949)
                                                                                                            OPTIONAL -- Need R
```

NTN-Config field descriptions

EphemerisInfo

This field provides satellite ephemeris either in format of position and velocity state vector or in format of orbital parameters. This field is excluded when determining changes in system information, i.e. changes to ephemerisInfo should neither result in system information change notifications nor in a modification of *valueTag* in *SIB1*.

epochTime

Indicate the epoch time for the NTN assistance information. When explicitly provided through SIB, or through dedicated signaling, the *EpochTime* is the starting time of a DL sub-frame, indicated by a SFN and a sub-frame number signaled together with the assistance information. For serving cell, the field *sfn* indicates the current SFN or the next upcoming SFN after the frame where the message indicating the *epochTime* is received. For neighbour cell, the *sfn* indicates the SFN nearest to the frame where the message indicating the *epochTime* is received. The reference point for epoch time of the serving NTN payload ephemeris and Common TA parameters is the uplink time synchronization reference point. If this field is absent, the epoch time is the end of SI window where this SIB19 is scheduled. This field is mandatory present when provided in dedicated configuration. If this field is absent in *ntn-Config* provided via *NTN-NeighCellConfig* the UE uses epoch time of the serving cell, otherwise the field is based on the timing of the serving cell, i.e. the SFN and sub-frame number indicated in this field refers to the SFN and sub-frame of the target cell. For the target cell the UE considers epoch time, indicated by the SFN and sub-frame number in this field, to be the frame nearest to the frame in which the message indicating the epoch time is received. This field is excluded when determining changes in system information, i.e. changes to *epochTime* should neither result in system information change notifications nor in a modification of *valueTag* in *SIB1*.

cellSpecificKoffset

Scheduling offset used for the timing relationships that are modified for NTN (see TS 38.213 [13]). The unit of the field K_offset is number of slots for a given subcarrier spacing of 15 kHz. If the field is absent UE assumes value 0.

kmac

Scheduling offset provided by network if downlink and uplink frame timing are not aligned at gNB. It is needed for UE action and assumption on downlink configuration indicated by a MAC CE command in PDSCH (see TS 38.213 [13]). If the field is absent UE assumes value 0.

For the reference subcarrier spacing value for the unit of K_mac in FR1, a value of 15 kHz is used. The unit of K_mac is number of slots for a given subcarrier spacing.

ntn-PolarizationDL

If present, this parameter indicates polarization information for downlink transmission on service link: including Right hand, Left hand circular polarizations (RHCP, LHCP) and Linear polarization.

ntn-PolarizationUL

If present, this parameter indicates Polarization information for uplink service link.

If not present and ntn-PolarizationDL is present, UE assumes the same polarization for UL and DL.

ntn-UISyncValidityDuration

A validity duration configured by the network for assistance information (i.e. Serving and/or neighbour satellite ephemeris and Common TA parameters) which indicates the maximum time duration (from *epochTime*) during which the UE can apply assistance information without having acquired new assistance information.

The unit of *ntn-UlSyncValidityDuration* is second. Value *s5* corresponds to 5 s, value *s10* indicate 10 s and so on. This parameter applies to both connected and idle mode UEs. If this field is absent in *ntn-Config* provided via *NTN-NeighCellConfig*, the UE uses validity duration from the serving cell assistance information. This field is excluded when determining changes in system information, i.e. changes of *ntn-UlSyncValidityDuration* should neither result in system information change notifications nor in a modification of *valueTag* in *SIB1*. *ntn-UlSyncValidityDuration* is only updated when at least one of *epochTime*, *ta-Info*, *ephemerisInfo* is updated.

ta-Common

Network-controlled common timing advanced value and it may include any timing offset considered necessary by the network. ta-Common with value of 0 is supported. The granularity of ta-Common is $4.072 \times 10^{\circ}(-3)$ μ s. Values are given in unit of corresponding granularity. This field is excluded when determining changes in system information, i.e. changes of ta-Common should neither result in system information change notifications nor in a modification of valueTag in SIB1.

ta-CommonDrift

Indicate drift rate of the common TA. The granularity of ta-CommonDrift is $0.2 \times 10^{\circ}(-3) \mu s/s$. Values are given in unit of corresponding granularity. This field is excluded when determining changes in system information, i.e. changes of *ta-CommonDrift* should neither result in system information change notifications nor in a modification of *valueTag* in SIB1.

ta-CommonDriftVariant

Indicate drift rate variation of the common TA. The granularity of ta-CommonDriftVariation is 0.2×10^(-4) µs/s^2. Values are given in unit of corresponding granularity. This field is excluded when determining changes in system information, i.e. changes of *ta-CommonDriftVariant* should neither result in system information change notifications nor in a modification of *valueTag* in SIB1.

ta-Report

When this field is included in SIB19, it indicates reporting of timing advanced is enabled during Random Access due to RRC connection establishment or RRC connection resume, and during RRC connection reestablishment. When this field is included in *ServingCellConfigCommon* within dedicated signalling, it indicates TA reporting is enabled during Random Access due to reconfiguration with sync (see TS 38.321 [3], clause 5.4.8).

Conditional Presence	Explanation
SIB19	The field is mandatory present for the serving cell in SIB19. The field is optionally present, Need R, otherwise.

NZP-CSI-RS-Resource

The IE *NZP-CSI-RS-Resource* is used to configure Non-Zero-Power (NZP) CSI-RS transmitted in the cell where the IE is included, which the UE may be configured to measure on (see TS 38.214 [19], clause 5.2.2.3.1). A change of configuration between periodic, semi-persistent or aperiodic for an *NZP-CSI-RS-Resource* is not supported without a release and add.

NZP-CSI-RS-Resource information element

```
-- ASN1START
-- TAG-NZP-CSI-RS-RESOURCE-START
NZP-CSI-RS-Resource ::=
   nzp-CSI-RS-ResourceId
                                       NZP-CSI-RS-ResourceId,
   resourceMapping
                                       CSI-RS-ResourceMapping,
   powerControlOffset
                                       INTEGER (-8..15),
   powerControlOffsetSS
                                       ENUMERATED{db-3, db0, db3, db6}
                                                                                      OPTIONAL, -- Need R
    scramblingID
                                       ScramblingId,
   periodicityAndOffset
                                       CSI-ResourcePeriodicityAndOffset
                                                                                      OPTIONAL, -- Cond PeriodicOrSemiPersistent
   qcl-InfoPeriodicCSI-RS
                                       TCI-StateId
                                                                                      OPTIONAL, -- Cond Periodic
-- TAG-NZP-CSI-RS-RESOURCE-STOP
-- ASN1STOP
```

NZP-CSI-RS-Resource field descriptions

periodicityAndOffset

Periodicity and slot offset *sl1* corresponds to a periodicity of 1 slot, *sl2* to a periodicity of two slots, and so on. The corresponding offset is also given in number of slots (see TS 38.214 [19], clause 5.2.2.3.1). Network always configures the UE with a value for this field for periodic and semi-persistent NZP-CSI-RS-Resource (as indicated in *CSI-ResourceConfig*).

powerControlOffset

Power offset of PDSCH RE to NZP CSI-RS RE. Value in dB (see TS 38.214 [19], clauses 5.2.2.3.1 and 4.1).

powerControlOffsetSS

Power offset of NZP CSI-RS RE to SSS RE. Value in dB (see TS 38.214 [19], clause 5.2.2.3.1).

qcl-InfoPeriodicCSI-RS

For a target periodic CSI-RS, contains a reference to one *TCI-State* in TCI-States for providing the QCL source and QCL type. For periodic CSI-RS, the source can be SSB or another periodic-CSI-RS. Refers to the *TCI-State* or *dI-OrJoint-TCI-State* which has this value for *tci-StateId* and is defined in *tci-StatesToAddModList* or in *dI-OrJointTCI-StateToAddModList* in the *PDSCH-Config* included in the *BWP-Downlink* corresponding to the serving cell and to the DL BWP to which the resource belongs to (see TS 38.214 [19], clause 5.2.2.3.1).

resourceMapping

OFDM symbol location(s) in a slot and subcarrier occupancy in a PRB of the CSI-RS resource.

scramblingID

Scrambling ID (see TS 38.214 [19], clause 5.2.2.3.1).

Conditional Presence	Explanation
Periodic	The field is optionally present, Need M, for periodic NZP-CSI-RS-Resources (as indicated in CSI-ResourceConfig). The field
	is absent otherwise.
PeriodicOrSemiPersistent	The field is optionally present, Need M, for periodic and semi-persistent NZP-CSI-RS-Resources (as indicated in CSI-
	ResourceConfig). The field is absent otherwise.

NZP-CSI-RS-ResourceId

The IE NZP-CSI-RS-ResourceId is used to identify one NZP-CSI-RS-Resource.

NZP-CSI-RS-Resourceld information element

```
-- ASN1START
-- TAG-NZP-CSI-RS-RESOURCEID-START

NZP-CSI-RS-ResourceId ::= INTEGER (0..maxNrofNZP-CSI-RS-Resources-1)

-- TAG-NZP-CSI-RS-RESOURCEID-STOP
-- ASN1STOP
```

NZP-CSI-RS-ResourceSet

The IE NZP-CSI-RS-ResourceSet is a set of Non-Zero-Power (NZP) CSI-RS resources (their IDs) and set-specific parameters.

NZP-CSI-RS-ResourceSet information element

```
-- ASN1START
-- TAG-NZP-CSI-RS-RESOURCESET-START
NZP-CSI-RS-ResourceSet ::=
                                    SEOUENCE {
    nzp-CSI-ResourceSetId
                                       NZP-CSI-RS-ResourceSetId,
    nzp-CSI-RS-Resources
                                       SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourcesPerSet)) OF NZP-CSI-RS-ResourceId,
    repetition
                                       ENUMERATED { on, off }
                                                                                                               OPTIONAL,
                                                                                                                           -- Need S
    aperiodicTriggeringOffset
                                       INTEGER(0..6)
                                                                                                               OPTIONAL,
                                                                                                                           -- Need S
                                       ENUMERATED {true}
                                                                                                               OPTIONAL, -- Need R
    trs-Info
    . . . ,
    ] ]
    aperiodicTriggeringOffset-r16
                                       INTEGER(0..31)
                                                                                                               OPTIONAL -- Need S
    ]],
    ] ]
    pdc-Info-r17
                                        ENUMERATED {true}
                                                                                                               OPTIONAL, -- Need R
    cmrGroupingAndPairing-r17
                                       CMRGroupingAndPairing-r17
                                                                                                               OPTIONAL, -- Need R
    aperiodicTriggeringOffset-r17
                                       INTEGER (0..124)
                                                                                                               OPTIONAL, -- Need S
    aperiodicTriggeringOffsetL2-r17
                                                                                                               OPTIONAL -- Need R
                                       INTEGER(0..31)
    11
CMRGroupingAndPairing-r17 ::=
                                     SEOUENCE {
    nrofResourcesGroup1-r17
                                         INTEGER (1..7),
    pair10fNZP-CSI-RS-r17
                                        NZP-CSI-RS-Pairing-r17
                                                                                                               OPTIONAL, -- Need R
    pair20fNZP-CSI-RS-r17
                                        NZP-CSI-RS-Pairing-r17
                                                                                                               OPTIONAL -- Need R
NZP-CSI-RS-Pairing-r17 ::=
                                    SEQUENCE {
                                         INTEGER (1..7),
    nzp-CSI-RS-ResourceId1-r17
    nzp-CSI-RS-ResourceId2-r17
                                         INTEGER (1..7)
-- TAG-NZP-CSI-RS-RESOURCESET-STOP
-- ASN1STOP
```

NZP-CSI-RS-ResourceSet field descriptions

aperiodicTriggeringOffset, aperiodicTriggeringOffset-r16, aperiodicTriggeringOffset-r17

Offset X between the slot containing the DCI that triggers a set of aperiodic NZP CSI-RS resources and the slot in which the CSI-RS resource set is transmitted. For aperiodicTriggeringOffset, the value 0 corresponds to 0 slots, value 1 corresponds to 1 slot, value 2 corresponds to 2 slots, value 3 corresponds to 3 slots, value 4 corresponds to 4 slots, value 5 corresponds to 16 slots, value 6 corresponds to 24 slots. For aperiodicTriggeringOffset-r16 and aperiodicTriggeringOffset-r17, the value indicates the number of slots. aperiodicTriggeringOffset-r17 is applicable to SCS 480 kHz and 960 kHz, and only the values of integer multiples of 4 are valid, i.e. 0, 4, 8, and so on. The network configures only one of the fields. When neither field is included, the UE applies the value 0.

aperiodicTriggeringOffsetL2

Indicates triggering offset of aperiodic NZP CSI-RS resources used for fast activation of the SCell (see clause 5.2.1.5.3 of TS 38.214 [19]), when the NZP CSI-RS resources are activated by the MAC CE (see clause 5.9 of TS 38.321 [3]). The value indicates the number of slots.

cmrGroupingAndPairing

Configures CMR groups and pairs. The first nrofResourcesGroup1 resources in the NZP-CSI-RS resource set belong to Group 1 and the remaining resources in the NZP-CSI-RS resource set belong to Group 2. nrofResourcesGroup1 is K_1 and the number of remaining resources in the NZP-CSI-RS resource set belonging to Group 2 is K_2 as specified in TS 38.214 clause 5.2.1.4.1. Maximum total number in Group 1 and Group 2 is 8 (see TS 38.214 [19], clauses 5.2.1.4.1 and 5.2.1.4.2).

pair10fNZP-CSI-RS, pair20fNZP-CSI-RS

A pair of NZP CSI-RS resources. In one pair, one resource shall belong to group 1 and the other resource shall belong to group 2 as configured by nrofResourcesGroup1 and nrofResourcesGroup2. (see TS 38.214 [19], clause xx).

nzp-CSI-RS-Resources

NZP-CSI-RS-Resources associated with this NZP-CSI-RS resource set (see TS 38.214 [19], clause 5.2). For CSI, there are at most 8 NZP CSI RS resources per resource set.

nzp-CSI-RS-Resourceld1, nzp-CSI-RS-Resourceld2

The nzp-CSI-RS-ResourceId1-r17 represents the index of the NZP CSI-RS resource in Resource Group 1, and nzp-CSI-RS-ResourceId2-r17 represents the index of the NZP CSI-RS resource in Resource Group 2.

pdc-Info

Indicates that this NZP-CSI-RS-ResourceSet, if configured also with *trs-Info*, is used for propagation delay compensation. The field can be present only if *trs-info* is present. The field can be present in only one *NZP-CSI-RS-ResourceSet*. If network configures this field for an *NZP-CSI-RS-ResourceSet*, the UE measures the UE Rx-Tx time difference based on resources configured in this resource set.

repetition

Indicates whether repetition is on/off. If the field is set to *off* or if the field is absent, the UE may not assume that the NZP-CSI-RS resources within the resource set are transmitted with the same downlink spatial domain transmission filter (see TS 38.214 [19], clauses 5.2.2.3.1 and 5.1.6.1.2). It can only be configured for CSI-RS resource sets which are associated with *CSI-ReportConfig* with report of L1 RSRP, L1 SINR or "no report".

trs-Info

Indicates that the antenna port for all NZP-CSI-RS resources in the CSI-RS resource set is same. If the field is absent or released the UE applies the value *false* (see TS 38.214 [19], clause 5.2.2.3.1).

NZP-CSI-RS-ResourceSetId

The IE NZP-CSI-RS-ResourceSetId is used to identify one NZP-CSI-RS-ResourceSet.

NZP-CSI-RS-ResourceSetId information element

```
-- ASN1START
-- TAG-NZP-CSI-RS-RESOURCESETID-START

NZP-CSI-RS-ResourceSetId ::= INTEGER (0..maxNrofNZP-CSI-RS-ResourceSets-1)
```

```
-- TAG-NZP-CSI-RS-RESOURCESETID-STOP
-- ASN1STOP
```

– P-Max

The IE *P-Max* is used to limit the UE's uplink transmission power on a carrier frequency, in TS 38.101-1 [15] and is used to calculate the parameter *Pcompensation* defined in TS 38.304 [20].

P-Max information element

```
-- ASN1START
-- TAG-P-MAX-START

P-Max ::= INTEGER (-30..33)

-- TAG-P-MAX-STOP
-- ASN1STOP
```


The IE *PathlossReferenceRS* is used to configure a Reference Signal (e.g. a CSI-RS config or a SS block) to be used for path loss estimation for PUSCH, PUCCH and SRS for unified TCI state operation.

PathlossReferenceRS information element

PathlossReferenceRS field descriptions

additionalPCI

Indicates the physical cell ID (PCI) of the SSB for the referenceSignal.

Conditional Presence	Explanation
RS-SSB	The field is optionally present, Need R, if ssb-Index is configured for reference Signal. Otherwise it is absent, Need R.

PathlossReferenceRS-Id

The IE PathlossReferenceRS-Id is an ID for a reference signal (RS) configured as PUSCH, PUCCH and SRS pathloss reference RS for unified TCI state operation.

PathlossReferenceRS-Id information element

```
-- ASN1START
-- TAG-PATHLOSSREFERENCERS-ID-START

PathlossReferenceRS-Id-r17 ::= INTEGER (0..maxNrofPathlossReferenceRSs-1-r17)
-- TAG-PATHLOSSREFERENCERS-ID-STOP
-- ASN1STOP
```

- PCI-ARFCN-EUTRA

The IE *PCI-ARFCN-EUTRA* is used to encode EUTRA PCI and ARFCN.

PCI-ARFCN-EUTRA information element

```
-- ASN1START
-- TAG-PCIARFCNEUTRA-START

PCI-ARFCN-EUTRA-r16 ::= SEQUENCE {
    physCellId-r16 EUTRA-PhysCellId,
    carrierFreq-r16 ARFCN-ValueEUTRA
}

-- TAG-PCIARFCNEUTRA-STOP
-- ASN1STOP
```

PCI-ARFCN-NR

The IE *PCI-ARFCN-NR* is used to encode NR PCI and ARFCN.

PCI-ARFCN-NR information element

```
-- ASN1START
-- TAG-PCIARFCNNR-START

PCI-ARFCN-NR-r16 ::= SEQUENCE {
```

- PCI-List

The IE *PCI-List* concerns a list of physical cell identities, which may be used for different purposes.

PCI-List information element

```
-- ASN1START
-- TAG-PCI-LIST-START

PCI-List ::= SEQUENCE (SIZE (1..maxNrofCellMeas)) OF PhysCellId
-- TAG-PCI-LIST-STOP
-- ASN1STOP
```

PCI-Range

-- ASN1STOP

The IE *PCI-Range* is used to encode either a single or a range of physical cell identities. The range is encoded by using a *start* value and by indicating the number of consecutive physical cell identities (including *start*) in the range. For fields comprising multiple occurrences of *PCI-Range*, the Network may configure overlapping ranges of physical cell identities.

PCI-Range information element

PCI-Range field descriptions

range

Indicates the number of physical cell identities in the range (including *start*). Value *n4* corresponds with 4, value *n8* corresponds with 8 and so on. The UE shall apply value 1 in case the field is absent, in which case only the physical cell identity value indicated by *start* applies.

start

Indicates the lowest physical cell identity in the range.

PCI-RangeElement

The IE PCI-RangeElement is used to define a PCI-Range as part of a list (e.g. AddMod list).

PCI-RangeElement information element

```
-- ASN1START
-- TAG-PCI-RANGEELEMENT-START

PCI-RangeElement ::= SEQUENCE {
    pci-RangeIndex PCI-RangeIndex,
    pci-Range PCI-Range
}

-- TAG-PCI-RANGEELEMENT-STOP
-- ASN1STOP
```

PCI-RangeElement field descriptions

pci-Range

Physical cell identity or a range of physical cell identities.

– PCI-RangeIndex

The IE PCI-RangeIndex identifies a physical cell id range, which may be used for different purposes.

PCI-RangeIndex information element

```
-- ASN1START
-- TAG-PCI-RANGEINDEX-START

PCI-RangeIndex ::= INTEGER (1..maxNrofPCI-Ranges)
-- TAG-PCI-RANGEINDEX-STOP
-- ASN1STOP
```

PCI-RangeIndexList

The IE *PCI-RangeIndexList* concerns a list of indexes of physical cell id ranges, which may be used for different purposes.

PCI-RangeIndexList information element

```
-- ASN1START
-- TAG-PCI-RANGEINDEXLIST-START

PCI-RangeIndexList ::= SEQUENCE (SIZE (1..maxNrofPCI-Ranges)) OF PCI-RangeIndex
-- TAG-PCI-RANGEINDEXLIST-STOP
-- ASN1STOP
```

PDCCH-Config

The IE *PDCCH-Config* is used to configure UE specific PDCCH parameters or MBS multicast PDCCH parameters such as control resource sets (CORESET), search spaces and additional parameters for acquiring the PDCCH. If this IE is used for the scheduled SCell in case of cross carrier scheduling, the fields other than *searchSpacesToAddModList* and *searchSpacesToReleaseList* are absent. If the IE is used for a dormant BWP, the fields other than *controlResourceSetToAddModList* and *controlResourceSetToReleaseList* are absent. If this IE is used for MBS CFR, the field *downlinkPreemptiom,tpc-PUSCH, tpc-SRS, uplinkCancellation, monitoringCapabilityConfig*, and *searchSpaceSwitchConfig* are absent.

PDCCH-Config information element

```
-- ASN1START
-- TAG-PDCCH-CONFIG-START
PDCCH-Config ::=
                                    SEQUENCE {
    controlResourceSetToAddModList
                                        SEOUENCE(SIZE (1..3)) OF ControlResourceSet
                                                                                                         OPTIONAL,
                                                                                                                     -- Need N
                                                                                                                     -- Need N
    controlResourceSetToReleaseList
                                        SEQUENCE(SIZE (1..3)) OF ControlResourceSetId
                                                                                                         OPTIONAL,
    searchSpacesToAddModList
                                        SEQUENCE(SIZE (1..10)) OF SearchSpace
                                                                                                         OPTIONAL,
                                                                                                                     -- Need N
    searchSpacesToReleaseList
                                        SEQUENCE(SIZE (1..10)) OF SearchSpaceId
                                                                                                         OPTIONAL,
                                                                                                                     -- Need N
    downlinkPreemption
                                        SetupRelease { DownlinkPreemption }
                                                                                                         OPTIONAL,
                                                                                                                     -- Need M
                                        SetupRelease { PUSCH-TPC-CommandConfig
                                                                                                         OPTIONAL,
                                                                                                                     -- Need M
    tpc-PUSCH
    tpc-PUCCH
                                        SetupRelease { PUCCH-TPC-CommandConfig
                                                                                                         OPTIONAL,
                                                                                                                     -- Need M
                                        SetupRelease { SRS-TPC-CommandConfig}
    tpc-SRS
                                                                                                         OPTIONAL,
                                                                                                                     -- Need M
    11
    controlResourceSetToAddModListSizeExt-v1610 SEQUENCE (SIZE (1..2)) OF ControlResourceSet
                                                                                                         OPTIONAL,
                                                                                                                     -- Need N
    controlResourceSetToReleaseListSizeExt-r16 SEQUENCE (SIZE (1..5)) OF ControlResourceSetId-r16
                                                                                                         OPTIONAL,
                                                                                                                     -- Need N
    searchSpacesToAddModListExt-r16
                                        SEQUENCE(SIZE (1..10)) OF SearchSpaceExt-r16
                                                                                                         OPTIONAL,
                                                                                                                     -- Need N
                                        SetupRelease { UplinkCancellation-r16 }
    uplinkCancellation-r16
                                                                                                         OPTIONAL,
                                                                                                                     -- Need M
    monitoringCapabilityConfig-r16
                                        ENUMERATED { r15monitoringcapability,r16monitoringcapability }
                                                                                                                     -- Need M
                                                                                                         OPTIONAL,
                                                                                                                     -- Need R
    searchSpaceSwitchConfig-r16
                                        SearchSpaceSwitchConfig-r16
                                                                                                         OPTIONAL
    ]],
    [ [
                                                                                                                     -- Need N
    searchSpacesToAddModListExt-v1700
                                        SEQUENCE(SIZE (1..10)) OF SearchSpaceExt-v1700
                                                                                                         OPTIONAL,
                                                                                                                     -- Need M
    monitoringCapabilityConfig-v1710
                                        ENUMERATED { r17monitoringcapability }
                                                                                                         OPTIONAL,
                                        SearchSpaceSwitchConfig-r17
    searchSpaceSwitchConfig-r17
                                                                                                         OPTIONAL,
                                                                                                                     -- Need R
```

-- Need R

```
pdcch-SkippingDurationList-r17
                                        SEQUENCE(SIZE (1..3)) OF SCS-SpecificDuration-r17
                                                                                                         OPTIONAL
    ]]
SearchSpaceSwitchConfig-r16 ::=
                                    SEOUENCE {
    cellGroupsForSwitchList-r16
                                        SEQUENCE(SIZE (1..4)) OF CellGroupForSwitch-r16
                                                                                                         OPTIONAL,
    searchSpaceSwitchDelay-r16
                                        INTEGER (10..52)
                                                                                                         OPTIONAL
SearchSpaceSwitchConfig-r17 ::=
                                    SEQUENCE {
    searchSpaceSwitchTimer-r17
                                        SCS-SpecificDuration-r17
                                                                                                         OPTIONAL,
    searchSpaceSwitchDelay-r17
                                        INTEGER (10..52)
                                                                                                         OPTIONAL
CellGroupForSwitch-r16 ::=
                                    SEQUENCE(SIZE (1..16)) OF ServCellIndex
SCS-SpecificDuration-r17
                                    INTEGER (1..166)
-- TAG-PDCCH-CONFIG-STOP
-- ASN1STOP
```

PDCCH-Config field descriptions

controlResourceSetToAddModList, controlResourceSetToAddModListSizeExt

List of UE specifically configured Control Resource Sets (CORESETs) to be used by the UE. The network restrictions on configuration of CORESETs per DL BWP are specified in TS 38.213 [13], clause 10.1 and TS 38.306 [26]. The UE shall consider entries in *controlResourceSetToAddModList* and in *controlResourceSetToAddModListSizeExt* as a single list, i.e. an entry created using *controlResourceSetToAddModList* can be modified using *controlResourceSetToAddModListSizeExt* (or deleted using *controlResourceSetToReleaseListSizeExt*) and vice-versa. In case network reconfigures control resource set with the same *ControlResourceSetId* as used for *commonControlResourceSet* or *commonControlResourceSetExt* configured via *PDCCH-ConfigCommon* or via *SIB20*, the configuration from *PDCCH-Config* always takes precedence and should not be updated by the UE based on *servingCellConfigCommon* or based on *SIB20*.

controlResourceSetToReleaseList.controlResourceSetToReleaseListSizeExt

List of UE specifically configured Control Resource Sets (CORESETs) to be released by the UE. This field only applies to CORESETs configured by controlResourceSetToAddModList or controlResourceSetToAddModListSizeExt and does not release the field commonControlResourceSet configured by PDCCH-ConfigCommon and commonControlResourceSetExt configured by SIB20.

downlinkPreemption

Configuration of downlink preemption indications to be monitored in this cell (see TS 38.213 [13], clause 11.2).

monitoringCapabilityConfig

Configures either Rel-15 PDCCH monitoring capability, Rel-16 PDCCH monitoring capability or Rel-17 PDCCH monitoring capability for PDCCH monitoring on a serving cell (see TS 38.213 [13], clause 10.1). Value *r15monitoringcapability* enables the Rel-15 monitoring capability, and value *r16monitoringcapability* enables the Rel-16 PDCCH monitoring capability. *r17monitoringcapability* enables the Rel-17 PDCCH multi-slot monitoring capability. For 480 and 960 kHz SCS, only value *r17monitoringcapability* is applicable.

pdcch-SkippingDurationList

Provides one or more values to derive the skipping duration in unit of slots, as specified in TS 38.213 [13], clause 10.4. The DCI which schedules data indicates which of the values is to be applied (see TS 38.213 [13], clause 10.4). For the 15kHz SCS, for each entry, only the first 26 values are valid and correspond to {1, 2, 3, ..., 20, 30, 40, 50, 60, 80, 100}. For the 30kHz SCS, for each entry, only the first 46 values are valid and correspond to {1, 2, 3, ..., 40, 60, 80, 100, 120, 160, 200}. For the 60kHz SCS, for each entry, only the first 86 values are valid and correspond to {1, 2, 3, ..., 80, 120, 160, 200, 240, 320, 400}. For the 120kHz SCS, for each entry, the 166 values correspond to {1, 2, 3, ..., 160, 240, 320, 400, 480, 640, 800}. For the 480kHz SCS, for each entry, the 166 values correspond to {4, 8, 12, ..., 640, 960, 1280, 1600, 1920, 2560, 3200}. For the 960kHz SCS, for each entry, the 166 values correspond to {8, 16, 24, ..., 1280, 1920, 2560, 3200, 3840, 5120, 6400}.

searchSpacesToAddModList, searchSpacesToAddModListExt

List of UE specifically configured Search Spaces or MBS multicast Search Spaces. The network configures at most 10 Search Spaces per BWP per cell (including UE-specific and common Search Spaces). If the network includes searchSpaceToAddModListExt, it includes the same number of entries, and listed in the same order, as in searchSpacesToAddModList in each of them.

searchSpaceSwitchConfig

Configuration to control the UE behavior to switch from search space group X back to search space group 0, as specified in clause 10 of TS 38.213 [13]. The network only configures either searchSpaceSwitchConfig-r16 or searchSpaceSwitchConfig-r17 for a UE.

tpc-PUCCH

Enable and configure reception of group TPC commands for PUCCH.

tpc-PUSCH

Enable and configure reception of group TPC commands for PUSCH.

tpc-SRS

Enable and configure reception of group TPC commands for SRS.

uplinkCancellation

Configuration of uplink cancellation indications to be monitored in this cell (see TS 38.213 [13], clause 11.2A).

SearchSpaceSwitchConfig field descriptions

cellGroupsForSwitchList

The list of serving cells which are bundled for the search space group switching purpose (see TS 38.213 [13], clause 10.4). A serving cell can belong to only one *CellGroupForSwitch*. The network configures the same list for all BWPs of serving cells in the same *CellGroupForSwitch*.

searchSpaceSwitchDelay

Indicates the value to be applied by a UE for Search Space Set Group switching; corresponds to the P value in TS 38.213 [13], clause 10.4. The network configures the same value for all BWPs of serving cells in the same *CellGroupForSwitch*. For 120/480/960 kHz SCS, only values 40,41, ... 52 are valid and the actual value = field value * SCS/120 kHz i.e. field value 40 corresponds to 40 with 120 kHz SCS, 160 with 480 kHz SCS and 320 with 960 kHz SCS, and so on.

searchSpaceSwitchTimer

Timer (in unit of slots) to control the UE behavior to switch from search space group X back to search space group 0, as specified in clause 10 of TS 38.213 [13]. For the 15kHz SCS, only the first 26 values are valid and correspond to {1, 2, 3, ..., 20, 30, 40, 50, 60, 80, 100}. For the 30kHz SCS, only the first 46 values are valid and correspond to {1, 2, 3, ..., 40, 60, 80, 100, 120, 160, 200}. For the 60kHz SCS, only the first 86 values are valid and correspond to {1, 2, 3, ..., 80, 120, 160, 200, 240, 320, 400}. For the 120kHz SCS, the 166 values correspond to {1, 2, 3, ..., 160, 240, 320, 400, 480, 640, 800}. For the 480kHz SCS, the 166 values correspond to {4, 8, 12, ..., 640, 960, 1280, 1600, 1920, 2560, 3200}. For the 960kHz SCS, the 166 values correspond to {8, 16, 24, ..., 1280, 1920, 2560, 3200, 3840, 5120, 6400}.

PDCCH-ConfigCommon

The IE *PDCCH-ConfigCommon* is used to configure cell specific PDCCH parameters provided in SIB as well as in dedicated signalling.

PDCCH-ConfigCommon information element

```
-- ASN1START
-- TAG-PDCCH-CONFIGCOMMON-START
PDCCH-ConfigCommon ::=
                                    SEOUENCE {
    controlResourceSetZero
                                        ControlResourceSetZero
                                                                                                OPTIONAL,
                                                                                                            -- Cond InitialBWP-Only
    commonControlResourceSet
                                        ControlResourceSet
                                                                                                OPTIONAL,
                                                                                                            -- Need R
    searchSpaceZero
                                        SearchSpaceZero
                                                                                                OPTIONAL,
                                                                                                            -- Cond InitialBWP-Only
    commonSearchSpaceList
                                        SEQUENCE (SIZE(1..4)) OF SearchSpace
                                                                                                OPTIONAL,
                                                                                                            -- Need R
    searchSpaceSIB1
                                        SearchSpaceId
                                                                                                OPTIONAL,
                                                                                                            -- Need S
                                        SearchSpaceId
    searchSpaceOtherSystemInformation
                                                                                                OPTIONAL,
                                                                                                            -- Need S
    pagingSearchSpace
                                        SearchSpaceId
                                                                                                OPTIONAL,
                                                                                                            -- Need S
    ra-SearchSpace
                                        SearchSpaceId
                                                                                                OPTIONAL,
                                                                                                            -- Need S
    11
    firstPDCCH-MonitoringOccasionOfPO
                                        CHOICE {
        sCS15KHZoneT
                                                                                 SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..139),
        sCS30KHZoneT-SCS15KHZhalfT
                                                                                 SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..279),
        sCS60KHZoneT-SCS30KHZhalfT-SCS15KHZquarterT
                                                                                 SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..559),
        sCS120KHZoneT-SCS60KHZhalfT-SCS30KHZquarterT-SCS15KHZoneEighthT
                                                                                 SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..1119),
        scS120KHzhalfT-ScS60KHzquarterT-ScS30KHzoneEighthT-ScS15KHzoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..2239),
       sCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT
                                                                                 SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..4479),
        sCS120KHZoneEighthT-SCS60KHZoneSixteenthT
                                                                                 SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..8959),
        sCS120KHZoneSixteenthT
                                                                                 SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..17919)
                                                                                                OPTIONAL
                                                                                                          -- Cond OtherBWP
    ]],
    [ [
    commonSearchSpaceListExt-r16
                                                                             SEQUENCE (SIZE(1..4)) OF SearchSpaceExt-r16
                                                                                                                             OPTIONAL -- Need R
```

```
sdt-SearchSpace-r17
                                        CHOICE {
                                            SearchSpace,
        newSearchSpace
        existingSearchSpace
                                            SearchSpaceId
                                                                                                 OPTIONAL.
                                                                                                             -- Need R
    searchSpaceMCCH-r17
                                        SearchSpaceId
                                                                                                             -- Need R
                                                                                                 OPTIONAL,
    searchSpaceMTCH-r17
                                        SearchSpaceId
                                                                                                 OPTIONAL,
                                                                                                             -- Need S
                                        SEOUENCE (SIZE(1..4)) OF SearchSpaceExt-v1700
    commonSearchSpaceListExt2-r17
                                                                                                 OPTIONAL,
                                                                                                            -- Need R
    firstPDCCH-MonitoringOccasionOfPO-v1710 CHOICE {
       sCS480KHZoneEighthT
                                                SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..35839),
       sCS480KHZoneSixteenthT
                                                SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..71679)
                                                                                                 OPTIONAL,
                                                                                                            -- Need R
   pei-ConfigBWP-r17
                           SEOUENCE {
        pei-SearchSpace-r17
                                            SearchSpaceId,
        firstPDCCH-MonitoringOccasionOfPEI-O-r17 CHOICE {
            sCS15KHZoneT
                                                                              SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..139),
                                                                              SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..279),
            sCS30KHZoneT-SCS15KHZhalfT
            sCS60KHZoneT-SCS30KHZhalfT-SCS15KHZquarterT
                                                                              SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..559),
            scs120KHzoneT-scs60KHzhalfT-scs30KHzquarterT-scs15KHzoneEiqhthT SEOUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..1119),
            sCS120KHZhalfT-SCS60KHZquarterT-SCS30KHZoneEighthT-SCS15KHZoneSixteenthT SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..2239),
            sCS480KHZoneT-SCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..4479),
                                                                              SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..8959),
            sCS480KHZhalfT-SCS120KHZoneEighthT-SCS60KHZoneSixteenthT
            sCS480KHZquarterT-SCS120KHZoneSixteenthT
                                                                              SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..17919),
            sCS480KHZoneEighthT
                                                                           SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..35839),
            sCS480KHZoneSixteenthT
                                                                           SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..71679)
                                                                                                 OPTIONAL
                                                                                                              -- Cond InitialBWP-Paging
    ]],
    [ [
    followUnifiedTCI-State-v1720
                                                                                                               -- Need R
                                           ENUMERATED {enabled}
                                                                                                  OPTIONAL
    11
-- TAG-PDCCH-CONFIGCOMMON-STOP
-- ASN1STOP
```

PDCCH-ConfigCommon field descriptions

commonControlResourceSet

An additional common control resource set which may be configured and used for any common or UE-specific search space. If the network configures this field, it uses a *ControlResourceSetId* other than 0 for this *ControlResourceSet*. The network configures the *commonControlResourceSet* in *SIB1* so that it is contained in the bandwidth of CORESET#0. If the RedCap-specific initial downlink BWP does not contain the entire CORESET#0, the network configures the *commonControlResourceSet* in *SIB1* for RedCap so that it is not contained in the bandwidth of CORESET#0.

commonSearchSpaceList, commonSearchSpaceListExt, commonSearchSpaceListExt2

A list of additional common search spaces. If the network configures this field, it uses the SearchSpaceIds other than 0. If the field is included, it replaces any previous list, i.e. all the entries of the list are replaced and each of the SearchSpace entries is considered to be newly created and the conditions and Need codes for setup of the entry apply. If the network includes commonSearchSpaceListExt/commonSearchSpaceListExt2, it includes the same number of entries, and listed in the same order, as in commonSearchSpaceList.

controlResourceSetZero

Parameters of the common CORESET#0 which can be used in any common or UE-specific search spaces. The values are interpreted like the corresponding bits in *MIB* pdcch-ConfigSIB1. Even though this field is only configured in the initial BWP (BWP#0) controlResourceSetZero can be used in search spaces configured in other DL BWP(s) than the initial DL BWP if the conditions defined in TS 38.213 [13], clause 10 are satisfied.

firstPDCCH-MonitoringOccasionOfPEI-O

Offset, in number of symbols, from the start of the reference frame for PEI-O to the start of the first PDCCH monitoring occasion of PEI-O on this BWP, see TS 38.213 [13], clause 10.4A. For the case *po-NumPerPEI* is smaller than Ns, UE applies the (floor(i_s/po-NumPerPEI)+1)-th value out of (N_s/po-NumPerPEI) configured values in *firstPDCCH-MonitoringOccasionOfPEI-O* for the symbol-level offset. When *po-NumPerPEI* is one or multiple of Ns, UE applies the first configured value in *firstPDCCH-MonitoringOccasionOfPEI-O* for the symbol-level offset.

firstPDCCH-MonitoringOccasionOfPO

Indicates the first PDCCH monitoring occasion of each PO of the PF on this BWP, see TS 38.304 [20]. The field sCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT and sCS120KHZoneSixteenthT can be applied for SCS 480kHz, corresponding to sCS480KHZoneT-SCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT, sCS480KHZhalfT-SCS120KHZoneEighthT-SCS60KHZoneSixteenthT and sCS480KHZquarterT-SCS120KHZoneSixteenthT in IE DownlinkConfigCommonSIB respectively.

followUnifiedTCI-State

When set to enabled, for PDCCH reception in CORESET #0, the UE applies the "indicated" DL only TCI or joint TCI as specified in TS 38.214 [19], clause 5.1.5.

pagingSearchSpace

ID of the search space for paging (see TS 38.213 [13], clause 10.1). If the field is absent, the UE does not receive paging in this BWP (see TS 38.213 [13], clause 10). This field is absent for the RedCap-specific initial downlink BWP, if it does not include CD-SSB and the entire CORESET#0. In that case, a RedCap UE in RRC_IDLE or RRC_INACTIVE shall monitor paging in the initial DL BWP that includes CORESET#0.

pei-ConfigBWP

Provides the configuration for PEI reception in this BWP. If the field is absent, the UE does not receive PEI in this BWP.

pei-SearchSpace

ID of dedicated search space for PEI. It can be configured to one of up to 4 common SS sets configured by *commonSearchSpaceList* with *SearchSpaceId* > 0. The CCE aggregation levels and maximum number of PDCCH candidates per CCE aggregation level follows Table 10.1-1 of TS38.213 [13]. *SearchSpaceId* = 0 can be configured for the case of SS/PBCH block and CORESET multiplexing pattern 2 or 3.

ra-SearchSpace

ID of the Search space for random access procedure (see TS 38.213 [13], clause 10.1). If the field is absent, the UE does not receive RAR in this BWP. This field is mandatory present in the DL BWP(s) if the conditions described in TS 38.321 [3], clause 5.15 are met.

sdt-SearchSpace

Common search space for CG-SDT and RA-SDT (see TS 38.213 [13]). If an existingSearchSpace is used, the network only signals the search space ID of the ra-SearchSpace.

searchSpaceMCCH

ID of the search space for MCCH. If the field is absent, the UE does not receive MCCH in this BWP (see TS 38.213 [13], clause 10). This field is absent for the RedCap-specific initial downlink BWP, if it does not include CD-SSB and the entire CORESET#0.

searchSpaceMTCH

ID of the search space for MTCH of MBS broadcast. If the field is absent, the UE applies searchSpaceMCCH also for MTCH, (see TS 38.213 [13], clause 10). This field is absent for the RedCap-specific initial downlink BWP, if it does not include CD-SSB and the entire CORESET#0.

searchSpaceOtherSystemInformation

ID of the Search space for other system information, i.e., *SIB2* and beyond (see TS 38.213 [13], clause 10.1). If the field is absent, the UE does not receive other system information in this BWP. This field is absent for the RedCap-specific initial DL BWP, if it does not include CD-SSB and the entire CORESET#0. In that case, a RedCap UE in RRC_IDLE or RRC_INACTIVE shall monitor PDCCH to receive other system information using *searchSpaceOtherSystemInformation* in the initial DL BWP that includes CD-SSB and the entire CORESET#0.

searchSpaceSIB1

ID of the search space for *SIB1* message. In the initial DL BWP of the UE's PCell, the network sets this field to 0. If the field is absent, the UE does not receive *SIB1* in this BWP. (see TS 38.213 [13], clause 10). This field is absent for the RedCap-specific initial DL BWP, if it does not include CD-SSB and the entire CORESET#0.

searchSpaceZero

Parameters of the common SearchSpace#0. The values are interpreted like the corresponding bits in *MIB pdcch-ConfigSIB1*. Even though this field is only configured in the initial BWP (BWP#0), searchSpaceZero can be used in search spaces configured in other DL BWP(s) than the initial DL BWP if the conditions described in TS 38.213 [13], clause 10, are satisfied.

Conditional Presence	Explanation
InitialBWP-Only	If SIB1 is broadcast the field is mandatory present in the PDCCH-ConfigCommon of the initial BWP (BWP#0) in
	ServingCellConfigCommon except it is the RedCap-specific initial BWP not including CD-SSB and the entire CORESET#0; it is
	absent in other BWPs and when sent in system information. If SIB1 is not broadcast and there is an SSB associated to the cell,
	the field is optionally present, Need M, in the PDCCH-ConfigCommon of the initial BWP (BWP#0) in ServingCellConfigCommon
	(still with the same setting for all UEs). In other cases, the field is absent.
OtherBWP	This field is optionally present, Need R, if this BWP is not the initialDownlinkBWP and pagingSearchSpace is configured in this
	BWP. Otherwise this field is absent.
InitialBWP-Paging	This field is optionally present, Need R, if this BWP is the initialDownlinkBWP or initialDownlinkBWP-RedCap including CD-SSB
	and the entire CORESET#0, and pei-Config is configured in DownlinkConfigCommonSIB. Otherwise, this field is absent.

– PDCCH-ConfigSIB1

The IE *PDCCH-ConfigSIB1* is used to configure CORESET#0 and search space#0.

PDCCH-ConfigSIB1 information element

```
-- ASN1START
-- TAG-PDCCH-CONFIGSIB1-START

PDCCH-ConfigSIB1 ::= SEQUENCE {
    controlResourceSetZero SearchSpaceZero}
}

-- TAG-PDCCH-CONFIGSIB1-STOP
-- ASN1STOP
```

PDCCH-ConfigSIB1 field descriptions

controlResourceSetZero

Determines a common ControlResourceSet (CORESET) with ID #0, see TS 38.213 [13], clause 13.

searchSpaceZero

Determines a common search space with ID #0, see TS 38.213 [13], clause 13.

PDCCH-ServingCellConfig

The IE PDCCH-ServingCellConfig is used to configure UE specific PDCCH parameters applicable across all bandwidth parts of a serving cell.

PDCCH-ServingCellConfig information element

```
-- ASN1START
-- TAG-PDCCH-SERVINGCELLCONFIG-START
PDCCH-ServingCellConfig ::=
                                    SEOUENCE {
                                        SetupRelease { SlotFormatIndicator }
    slotFormatIndicator
                                                                                                             OPTIONAL, -- Need M
    . . . ,
    ] ]
    availabilityIndicator-r16
                                        SetupRelease {AvailabilityIndicator-r16}
                                                                                                             OPTIONAL,
                                                                                                                         -- Need M
    searchSpaceSwitchTimer-r16
                                        INTEGER (1..80)
                                                                                                             OPTIONAL
                                                                                                                         -- Need R
    ]],
    1 1
    searchSpaceSwitchTimer-v1710
                                        INTEGER (81..1280)
                                                                                                             OPTIONAL
                                                                                                                        -- Need R
    11
-- TAG-PDCCH-SERVINGCELLCONFIG-STOP
-- ASN1STOP
```

PDCCH-ServingCellConfig field descriptions

availabilityIndicator

Use to configure monitoring a PDCCH for Availability Indicators (AI).

searchSpaceSwitchTimer

The value of the timer in slots for monitoring PDCCH in the active DL BWP of the serving cell before moving to the default search space group (see TS 38.213 [13], clause 10.4).

```
For 15 kHz SCS, {1..20} are valid.
For 30 kHz SCS, {1..40} are valid.
For 60kHz SCS, {1..80} are valid.
For 120 kHz SCS, {1..160} are valid.
For 480 kHz SCS, {1..640} are valid.
```

For 960 kHz SCS, {1,,1280} are valid.

The network configures the same value for all serving cells in the same CellGroupForSwitch.

slotFormatIndicator

Configuration of Slot-Format-Indicators to be monitored in the correspondingly configured PDCCHs of this serving cell.

PDCP-Config

The IE *PDCP-Config* is used to set the configurable PDCP parameters for signalling, MBS multicast and data radio bearers.

PDCP-Config information element

```
-- ASN1START
-- TAG-PDCP-CONFIG-START
PDCP-Config ::=
                        SEOUENCE {
    drb
                            SEQUENCE
        discardTimer
                                ENUMERATED {ms10, ms20, ms30, ms40, ms50, ms60, ms75, ms100, ms150, ms200,
                                             ms250, ms300, ms500, ms750, ms1500, infinity}
                                                                                                  OPTIONAL, -- Cond Setup
        pdcp-SN-SizeUL
                                ENUMERATED {len12bits, len18bits}
                                                                                                  OPTIONAL, -- Cond Setup1
                                ENUMERATED {len12bits, len18bits}
                                                                                                  OPTIONAL, -- Cond Setup2
        pdcp-SN-SizeDL
        headerCompression
                                CHOICE {
            notUsed
                                    NULL,
            rohc
                                     SEQUENCE {
                maxCID
                                         INTEGER (1..16383)
                                                                                                  DEFAULT 15,
                profiles
                                         SEOUENCE {
                    profile0x0001
                                             BOOLEAN,
                    profile0x0002
                                             BOOLEAN,
                    profile0x0003
                                             BOOLEAN,
                    profile0x0004
                                             BOOLEAN,
                    profile0x0006
                                             BOOLEAN,
                    profile0x0101
                                             BOOLEAN,
                    profile0x0102
                                             BOOLEAN,
                    profile0x0103
                                             BOOLEAN,
                    profile0x0104
                                             BOOLEAN
                drb-ContinueROHC
                                             ENUMERATED { true }
                                                                                                  OPTIONAL
                                                                                                              -- Need N
            uplinkOnlyROHC
                                     SEQUENCE {
                maxCID
                                         INTEGER (1..16383)
                                                                                                  DEFAULT 15,
                profiles
                                         SEQUENCE {
                    profile0x0006
                                             BOOLEAN
                                             ENUMERATED { true }
                drb-ContinueROHC
                                                                                                  OPTIONAL
                                                                                                              -- Need N
        integrityProtection
                                ENUMERATED
                                              enabled }
                                                                                                  OPTIONAL,
                                                                                                              -- Cond ConnectedTo5GC1
        statusReportRequired
                                ENUMERATED
                                                                                                              -- Cond Rlc-AM-UM
                                              true
                                                                                                  OPTIONAL,
        outOfOrderDelivery
                                ENUMERATED { true
                                                                                                  OPTIONAL
                                                                                                              -- Need R
                                                                                                  OPTIONAL,
                                                                                                              -- Cond DRB
    moreThanOneRLC
                            SEQUENCE {
        primaryPath
                                SEQUENCE {
                                    CellGroupId
            cellGroup
                                                                                                  OPTIONAL,
                                                                                                              -- Need R
            logicalChannel
                                    LogicalChannelIdentity
                                                                                                  OPTIONAL
                                                                                                              -- Need R
        ul-DataSplitThreshold
                                UL-DataSplitThreshold
                                                                                                  OPTIONAL,
                                                                                                              -- Cond SplitBearer
        pdcp-Duplication
                                                                                                               -- Need R
                                     BOOLEAN
                                                                                                  OPTIONAL
                                                                                                  OPTIONAL,
                                                                                                              -- Cond MoreThanOneRLC
```

```
t-Reordering
                                ENUMERATED {
                                    ms0, ms1, ms2, ms4, ms5, ms8, ms10, ms15, ms20, ms30, ms40,
                                    ms50, ms60, ms80, ms100, ms120, ms140, ms160, ms180, ms200, ms220,
                                    ms240, ms260, ms280, ms300, ms500, ms750, ms1000, ms1250,
                                    ms1500, ms1750, ms2000, ms2250, ms2500, ms2750,
                                    ms3000, spare28, spare27, spare26, spare25, spare24,
                                    spare23, spare22, spare21, spare20,
                                    spare19, spare18, spare17, spare16, spare15, spare14,
                                    spare13, spare12, spare11, spare10, spare09,
                                    spare08, spare07, spare06, spare05, spare04, spare03,
                                    spare02, spare01 }
                                                                                                OPTIONAL, -- Need S
    . . . ,
    Π
    cipheringDisabled
                            ENUMERATED {true}
                                                                                                OPTIONAL
                                                                                                             -- Cond ConnectedTo5GC
    11.
    discardTimerExt-r16
                            SetupRelease { DiscardTimerExt-r16 }
                                                                                                OPTIONAL,
                                                                                                             -- Cond DRB2
    moreThanTwoRLC-DRB-r16 SEQUENCE {
        splitSecondaryPath-r16 LogicalChannelIdentity
                                                                                                OPTIONAL,
                                                                                                            -- Cond SplitBearer2
       duplicationState-r16 SEQUENCE (SIZE (3)) OF BOOLEAN
                                                                                                OPTIONAL
                                                                                                             -- Need S
                                                                                                OPTIONAL,
                                                                                                            -- Cond MoreThanTwoRLC-DRB
    ethernetHeaderCompression-r16 SetupRelease { EthernetHeaderCompression-r16 }
                                                                                                OPTIONAL
                                                                                                             -- Need M
    11,
    ] ]
    survivalTimeStateSupport-r17
                                   ENUMERATED {true}
                                                                                                OPTIONAL.
                                                                                                            -- Cond Drb-Duplication
                                                                                                            -- Cond Rlc-AM
    uplinkDataCompression-r17
                                   SetupRelease { UplinkDataCompression-r17 }
                                                                                                OPTIONAL,
    discardTimerExt2-r17
                                   SetupRelease { DiscardTimerExt2-r17 }
                                                                                                OPTIONAL,
                                                                                                            -- Need M
    initialRX-DELIV-r17
                                   BIT STRING (SIZE (32))
                                                                                                OPTIONAL
                                                                                                            -- Cond MRB-Initialization
    11
EthernetHeaderCompression-r16 ::= SEQUENCE {
    ehc-Common-r16
                                       SEQUENCE {
        ehc-CID-Length-r16
                                           ENUMERATED { bits7, bits15 },
    ehc-Downlink-r16
                                   SEOUENCE {
                                       ENUMERATED { true }
       drb-ContinueEHC-DL-r16
                                                                                                OPTIONAL,
                                                                                                            -- Need N
        . . .
                                                                                                OPTIONAL,
                                                                                                            -- Need M
    ehc-Uplink-r16
                                   SEOUENCE {
                                       INTEGER (1..32767),
       maxCID-EHC-UL-r16
                                       ENUMERATED { true }
       drb-ContinueEHC-UL-r16
                                                                                                OPTIONAL.
                                                                                                            -- Need N
        . . .
                                                                                                OPTIONAL
                                                                                                            -- Need M
UL-DataSplitThreshold ::= ENUMERATED {
                                            b0, b100, b200, b400, b800, b1600, b3200, b6400, b12800, b25600, b51200, b102400, b204800,
                                            b409600, b819200, b1228800, b1638400, b2457600, b3276800, b4096000, b4915200, b5734400,
                                            b6553600, infinity, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1
DiscardTimerExt-r16 ::= ENUMERATED {ms0dot5, ms1, ms2, ms4, ms6, ms8, spare2, spare1}
```

PDCP-Config field descriptions

cipheringDisabled

If included, ciphering is disabled for this DRB regardless of which ciphering algorithm is configured for the SRB/DRBs. The field may only be included if the UE is connected to 5GC. Otherwise the field is absent. The network configures all DRBs with the same PDU-session ID with same value for this field. The value for this field cannot be changed after the DRB is set up.

discardTimer

Value in ms of discardTimer specified in TS 38.323 [5]. Value ms10 corresponds to 10 ms, value ms20 corresponds to 20 ms and so on. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer.

discardTimerExt

Value in ms of discardTimer specified in TS 38.323 [5]. Value ms0dot5 corresponds to 0.5 ms, value ms1 corresponds to 1ms and so on. If this field is present, the field discardTimer is ignored and discardTimerExt is used instead.

discardTimerExt2

Value in ms of discardTimerExt specified in TS 38.323 [5]. Value ms2000 corresponds to 2000 ms. If this field is present, the field discardTimer and discardTimerExt are ignored and discardTimerExt2 is used instead.

drb-ContinueROHC

Indicates whether the PDCP entity continues or resets the ROHC header compression protocol during PDCP re-establishment, as specified in TS 38.323 [5]. This field is configured only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the *fullConfig* is not indicated. The network does not include the field if the bearer is configured as DAPS bearer. This field can be configured for both DRB and multicast MRB.

duplicationState

This field indicates the uplink PDCP duplication state for the associated RLC entities at the time of receiving this IE. If set to *true*, the PDCP duplication state is activated for the associated RLC entity. The index for the indication is determined by ascending order of logical channel ID of all RLC entities other than the primary RLC entity indicated by *primaryPath* in the order of MCG and SCG, as in clause 6.1.3.32 of TS 38.321 [3]. If the number of associated RLC entities other than the primary RLC entity is two, UE ignores the value in the largest index of this field. If the field is absent, the PDCP duplication states are deactivated for all associated RLC entities.

ethernetHeaderCompression

This fields configures Ethernet Header Compression. This field can only be configured for a bi-directional DRB or a bi-directional multicast MRB. The network reconfigures ethernetHeaderCompression only upon reconfiguration involving PDCP re-establishment and with neither drb-ContinueEHC-DL nor drb-ContinueEHC-UL configured. Network only configures this field when uplinkDataCompression is not configured.

headerCompression

If rohc is configured, the UE shall apply the configured ROHC profile(s) in both uplink and downlink. If *uplinkOnlyROHC* is configured, the UE shall apply the configured ROHC profile(s) in uplink (there is no header compression in downlink). ROHC can be configured for any bearer type. ROHC and EHC can be both configured simultaneously for a DRB or a multicast MRB. The network reconfigures *headerCompression* only upon reconfiguration involving PDCP re-establishment or involving PDCP entity reconfiguration to configure DAPS bearer(s), and without any *drb-ContinueROHC*. Network configures *headerCompression* to *notUsed* when *outOfOrderDelivery* is configured. Network only configures this field when *uplinkDataCompression* is not configured.

initialRX-DELIV

Indicates the initial value of RX_DELIV during PDCP window initialization for multicast MRB as specified in TS 38.323 [5].

integrityProtection

Indicates whether or not integrity protection is configured for this radio bearer. The network configures all DRBs with the same PDU-session ID with same value for this field. The value for this field cannot be changed after the DRB is set up.

maxCID

Indicates the value of the MAX_CID parameter as specified in TS 38.323 [5].

The total value of MAX_CIDs across all bearers for the UE should be less than or equal to the value of maxNumberROHC-ContextSessions parameter as indicated by the UE.

moreThanOneRLC

This field configures UL data transmission when more than one RLC entity is associated with the PDCP entity. This field is not present if the bearer is configured as DAPS bearer.

moreThanTwoRLC-DRB

This field configures UL data transmission when more than two RLC entities are associated with the PDCP entity for DRBs.

PDCP-Config field descriptions

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outOfOrderDelivery

Indicates whether or not *outOfOrderDelivery* specified in TS 38.323 [5] is configured. This field should be either always present or always absent, after the radio bearer is established.

pdcp-Duplication

Indicates whether or not uplink duplication status at the time of receiving this IE is configured and activated as specified in TS 38.323 [5]. The presence of this field indicates that duplication is configured. PDCP duplication is not configured for CA packet duplication of LTE RLC bearer. The value of this field, when the field is present, indicates the state of the duplication at the time of receiving this IE. If set to *true*, duplication is activated. The value of this field is always *true*, when configured for a SRB. For PDCP entity with more than two associated RLC entities for UL transmission, this field is always present. If the field *moreThanTwoRLC-DRB* is present, the value of this field is ignored and the state of the duplication is indicated by *duplicationState*. For PDCP entity with more than two associated RLC entities, only NR RLC bearer is supported.

pdcp-SN-SizeDL

PDCP sequence number size for downlink, 12 or 18 bits, as specified in TS 38.323 [5]. For SRBs only the value *len12bits* is applicable. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer.

pdcp-SN-SizeUL

PDCP sequence number size for uplink, 12 or 18 bits, as specified in TS 38.323 [5]. For SRBs only the value *len12bits* is applicable. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer.

primaryPath

Indicates the cell group ID and LCID of the primary RLC entity as specified in TS 38.323 [5], clause 5.2.1 for UL data transmission when more than one RLC entity is associated with the PDCP entity. In this version of the specification, only cell group ID corresponding to MCG is supported for SRBs, except for the split SRB2 of the IAB-MT, and, when the SCG is deactivated, for DRBs. The NW indicates *cellGroup* for split bearers using logical channels in different cell groups. The NW always indicates *logicalChannel* if CA based PDCP duplication is configured in the cell group indicated by *cellGroup* of this field.

splitSecondaryPath

Indicates the LCID of the split secondary RLC entity as specified in TS 38.323 [5] for fallback to split bearer operation when UL data transmission with more than two RLC entities is associated with the PDCP entity. This RLC entity belongs to a cell group that is different from the cell group indicated by *cellGroup* in the field *primaryPath*.

statusReportRequired

For AM DRBs, AM MRBs and DAPS UM DRBs, indicates whether the DRB or the multicast MRB is configured to send a PDCP status report in the uplink, as specified in TS 38.323 [5]. For DAPS AM DRBs, it also indicates whether the DRB is configured to send a second PDCP status report in the uplink, as specified in TS 38.323 [5].

survivalTimeStateSupport

Indicates whether the DRB associated with this PDCP entity has survival time state support. If this field is configured to be true, all associated RLC entities are activated for PDCP duplication upon reception of a retransmission grant addressed to CS-RNTI, as specified in TS 38.321 [3].

t-Reordering

Value in ms of t-Reordering specified in TS 38.323 [5]. Value *ms0* corresponds to 0 ms, value *ms20* corresponds to 20 ms, value *ms40* corresponds to 40 ms, and so on. When the field is absent the UE applies the value *infinity*. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer.

ul-DataSplitThreshold

Parameter specified in TS 38.323 [5]. Value *b0* corresponds to 0 bytes, value *b100* corresponds to 100 bytes, value *b200* corresponds to 200 bytes, and so on. The network sets this field to *infinity* for UEs not supporting *splitDRB-withUL-Both-MCG-SCG* and when the SCG is deactivated. If the field is absent when the split bearer is configured for the radio bearer first time, then the default value *infinity* is applied.

uplinkDataCompression

Indicates the UDC configuration that the UE shall apply. Network does not configure *uplinkDataCompression* for a DRB, if *headerCompression* or *ethernetHeaderCompression* is already configured or *outOfOrderDelivery* or DAPS is configured for the DRB. The maximum number of DRBs where *uplinkDataCompression* can be applied is two. The network reconfigures *uplinkDataCompression* only upon reconfiguration involving PDCP re-establishment. If the field is set to *drb-ContinueUDC*, the PDCP entity continues the uplink data compression protocol during PDCP re-establishment, as specified in TS 38.323 [5]. The field is set to *drb-ContinueUDC* only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the *fullConfig* is not indicated.

EthernetHeaderCompression field descriptions

drb-ContinueEHC-DL

Indicates whether the PDCP entity continues or resets the downlink EHC header compression protocol during PDCP re-establishment, as specified in TS 38.323 [5]. The field is configured only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the *fullConfig* is not indicated.

drb-ContinueEHC-UL

Indicates whether the PDCP entity continues or resets the uplink EHC header compression protocol during PDCP re-establishment, as specified in TS 38.323 [5]. The field is configured only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the *fullConfig* is not indicated.

ehc-CID-Length

Indicates the length of the CID field for EHC packet. The value bits7 indicates the length is 7 bits, and the value bits15 indicates the length is 15 bits. Once the field ethernetHeaderCompression-r16 is configured for a DRB or a multicast MRB, the value of the field ehc-CID-Length for this DRB or multicast MRB is not reconfigured to a different value.

ehc-Common

Indicates the configurations that apply for both downlink and uplink.

ehc-Downlink

Indicates the configurations that apply for only downlink. If the field is configured, then Ethernet header compression is configured for downlink. Otherwise, it is not configured for downlink.

ehc-Uplink

Indicates the configurations that apply for only uplink. If the field is configured, then Ethernet header compression is configured for uplnik. Otherwise, it is not configured for uplink.

maxCID-EHC-UL

Indicates the value of the MAX_CID_EHC_UL parameter as specified in TS 38.323 [5]. The total value of MAX_CID_EHC_UL across all bearers for the UE should be less than or equal to the value of maxNumberEHC-Contexts parameter as indicated by the UE.

UplinkDataCompression field descriptions

bufferSize

This field indicates the buffer size applied for UDC as specified in TS 38.323 [5]. Value kbyte2 means 2048 bytes, kbyte4 means 4096 bytes and so on.

dictionary

This field indicates which pre-defined dictionary is used for UDC as specified in TS 38.323 [5]. The value *sip-SDP* means that UE shall prefill the buffer with standard dictionary for SIP and SDP defined in TS 38.323 [5], and the value *operator* means that UE shall prefill the buffer with operator-defined dictionary.

Conditional presence	Explanation
DRB	This field is mandatory present when the corresponding DRB/multicast MRB is being set up, absent for SRBs. Otherwise this field is
	optionally present, need M.
DRB2	This field is optionally present in case of DRB, need M. Otherwise, it is absent for SRBs and MRBs.
Drb-Duplication	For SRBs, this field is absent. For DRBs, this field is absent if duplication is not configured. Otherwise, this field is optional, need R.
MoreThanOneRLC	This field is mandatory present upon RRC reconfiguration with setup of a PDCP entity for a radio bearer with more than one associated
	logical channel and upon RRC reconfiguration with the association of additional logical channels to the PDCP entity.
	The field is also mandatory present in case the field <i>moreThanTwoRLC-DRB</i> is included in <i>PDCP-Config</i> .
	Upon RRC reconfiguration when a PDCP entity is associated with multiple logical channels, this field is optionally present need M.
	Otherwise, this field is absent. Need R.
MoreThanTwoRLC-DRB	For SRBs, this field is absent.
	For DRBs, this field is mandatory present upon RRC reconfiguration with setup of a PDCP entity for a radio bearer with more than two
	associated logical channels and upon RRC reconfiguration with the association of one or more additional logical channel(s) to the PDCP
	entity so that the PDCP entity has more than two associated logical channels.
	Upon RRC reconfiguration when a PDCP entity is associated with more than two logical channels, this field is optionally present, Need M.
	Otherwise, the field is absent, Need R.
RIc-AM	For RLC AM, the field is optionally present, need M. Otherwise, the field is absent.
RIc-AM-UM	In case of DRB, for RLC UM (if the UE supports DAPS handover) or RLC AM, the field is optionally present, need R. In case of multicast
	MRB, if multicast MRB is associated with at least one RLC AM entity, the field is optionally present, need R. Otherwise, the field is absent.
Setup	The field is mandatory present in case of SRB or DRB setup. Otherwise the field is optionally present, need M.
SplitBearer	The field is absent for SRBs. Otherwise, the field is optional present, need M, in case of radio bearer with more than one associated RLC
	mapped to different cell groups.
SplitBearer2	The field is mandatory present, in case of a split bearer. Otherwise the field is absent.
ConnectedTo5GC	The field is optionally present, need R, if the UE is connected to 5GC. Otherwise the field is absent.
ConnectedTo5GC1	The field is optionally present, need R, if the UE is connected to NR/5GC or if the UE supports user plane integrity protection when
	connected to E-UTRA/EPC (as specified in TS 33.401 [30]). Otherwise the field is absent.
Setup1	This field is mandatory present in case of SRB and DRB setup for RLC-AM and RLC-UM. Otherwise, this field is absent, Need M.
Setup2	This field is mandatory present in case for radio bearer setup for RLC-AM and RLC-UM. Otherwise, this field is absent, Need M.
MRB-Initialization	This field is mandatory present in case of multicast MRB setup. In case of PDCP re-establishment for multicast MRB, this field is
	optionally present, Need N. Otherwise, this field is absent, Need N.

PDSCH-Config

The PDSCH-Config IE is used to configure the UE specific PDSCH parameters. If this IE is used for MBS CFR, the following fields shall be absent: tci-StatesToAddModList, tci-StatesToReleaseList, zp-CSI-RS-ResourceToAddModList, minimumSchedulingOffsetK0, antennaPortsFieldPresenceDCI-1-2, aperiodicZP-CSI-RS-ResourceSetsToAddModListDCI-1-2, aperiodicZP-CSI-RS-ResourceSetsToReleaseListDCI-1-2, dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2, dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2, dmrs-SequenceInitializationDCI-1-2, harq-ProcessNumberSizeDCI-1-2, mcs-TableDCI-1-2, numberOfBitsForRV-DCI-1-2, pdsch-AggregationFactor, pdsch-TimeDomainAllocationListDCI-1-2, prb-BundlingTypeDCI-1-2, priorityIndicatorDCI-1-2, rateMatchPatternGroup1DCI-1-2, rateMatchPatternGroup2DCI-1-2, resourceAllocationType1GranularityDCI-1-2, vrb-ToPRB-InterleaverDCI-1-2, referenceOfSLIVDCI-1-2, resourceAllocationDCI-1-2, dataScramblingIdentityPDSCH2-r16, repetitionSchemeConfig.

PDSCH-Config information element

```
-- TAG-PDSCH-CONFIG-START
PDSCH-Config ::=
                                        SEOUENCE {
    dataScramblingIdentityPDSCH
                                            INTEGER (0..1023)
                                                                                                                OPTIONAL.
                                                                                                                           -- Need S
    dmrs-DownlinkForPDSCH-MappingTypeA
                                            SetupRelease { DMRS-DownlinkConfig }
                                                                                                                OPTIONAL.
                                                                                                                            -- Need M
    dmrs-DownlinkForPDSCH-MappingTypeB
                                            SetupRelease { DMRS-DownlinkConfig }
                                                                                                                            -- Need M
                                                                                                                OPTIONAL,
    tci-StatesToAddModList
                                            SEOUENCE (SIZE(1..maxNrofTCI-States)) OF TCI-State
                                                                                                                OPTIONAL,
                                                                                                                            -- Need N
    tci-StatesToReleaseList
                                            SEQUENCE (SIZE(1..maxNrofTCI-States)) OF TCI-StateId
                                                                                                                OPTIONAL,
                                                                                                                           -- Need N
    vrb-ToPRB-Interleaver
                                            ENUMERATED {n2, n4}
                                                                                                                OPTIONAL,
                                                                                                                            -- Need S
    resourceAllocation
                                            ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch},
                                            SetupRelease { PDSCH-TimeDomainResourceAllocationList }
                                                                                                                OPTIONAL,
    pdsch-TimeDomainAllocationList
                                                                                                                            -- Need M
                                            ENUMERATED { n2, n4, n8 }
                                                                                                                OPTIONAL,
                                                                                                                            -- Need S
    pdsch-AggregationFactor
    rateMatchPatternToAddModList
                                            SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPattern
                                                                                                                OPTIONAL.
                                                                                                                            -- Need N
    rateMatchPatternToReleaseList
                                            SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPatternId OPTIONAL,
                                                                                                                           -- Need N
    rateMatchPatternGroup1
                                            RateMatchPatternGroup
                                                                                                                OPTIONAL,
                                                                                                                           -- Need R
    rateMatchPatternGroup2
                                            RateMatchPatternGroup
                                                                                                                OPTIONAL,
                                                                                                                           -- Need R
                                            ENUMERATED {config1, config2},
    rbq-Size
                                            ENUMERATED {gam256, gam64LowSE}
    mcs-Table
                                                                                                                OPTIONAL,
                                                                                                                           -- Need S
    maxNrofCodeWordsScheduledByDCI
                                            ENUMERATED {n1, n2}
                                                                                                                OPTIONAL,
                                                                                                                           -- Need R
                                            CHOICE {
    prb-BundlingType
        staticBundling
                                                SEOUENCE {
           bundleSize
                                                    ENUMERATED { n4, wideband }
                                                                                                                OPTIONAL
                                                                                                                            -- Need S
       dynamicBundling
                                            SEOUENCE {
           bundleSizeSet1
                                                ENUMERATED { n4, wideband, n2-wideband, n4-wideband }
                                                                                                                OPTIONAL,
                                                                                                                            -- Need S
           bundleSizeSet2
                                                ENUMERATED { n4, wideband }
                                                                                                                            -- Need S
                                                                                                                OPTIONAL
    zp-CSI-RS-ResourceToAddModList
                                                    SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-Resources)) OF ZP-CSI-RS-Resource
                                                                                                                OPTIONAL,
    zp-CSI-RS-ResourceToReleaseList
                                                    SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-Resources)) OF ZP-CSI-RS-ResourceId
                                                                                                                OPTIONAL,
                                                                                                                            -- Need N
    aperiodic-ZP-CSI-RS-ResourceSetsToAddModList
                                                   SEOUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSet
                                                                                                                OPTIONAL,
    aperiodic-ZP-CSI-RS-ResourceSetsToReleaseList SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSetId
                                                                                                                OPTIONAL,
                                                                                                                           -- Need N
    sp-ZP-CSI-RS-ResourceSetsToAddModList
                                           SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSet
                                                                                                                OPTIONAL,
                                                                                                                            -- Need N
    sp-ZP-CSI-RS-ResourceSetsToReleaseList SEOUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSetId
                                                                                                                OPTIONAL,
                                                                                                                            -- Need N
                                            SetupRelease { ZP-CSI-RS-ResourceSet }
    p-ZP-CSI-RS-ResourceSet
                                                                                                                OPTIONAL,
                                                                                                                            -- Need M
    11
    maxMIMO-Layers-r16
                                            SetupRelease { MaxMIMO-LayersDL-r16 }
                                                                                                                OPTIONAL,
                                                                                                                           -- Need M
    minimumSchedulingOffsetK0-r16
                                            SetupRelease { MinSchedulingOffsetK0-Values-r16 }
                                                                                                                OPTIONAL,
                                                                                                                            -- Need M
    -- Start of the parameters for DCI format 1_2 introduced in V16.1.0
    antennaPortsFieldPresenceDCI-1-2-r16
                                                    ENUMERATED {enabled}
                                                                                                                OPTIONAL, -- Need S
    aperiodicZP-CSI-RS-ResourceSetsToAddModListDCI-1-2-r16 SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSet
                                                                                                                OPTIONAL, -- Need N
```

```
aperiodicZP-CSI-RS-ResourceSetsToReleaseListDCI-1-2-r16 SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSetId
                                                                                                            OPTIONAL.
                                                                                                                       -- Need N
dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2-r16 SetupRelease { DMRS-DownlinkConfig }
                                                                                                            OPTIONAL.
                                                                                                                        -- Need M
                                                                                                                        -- Need M
dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2-r16 SetupRelease { DMRS-DownlinkConfig }
                                                                                                            OPTIONAL.
dmrs-SequenceInitializationDCI-1-2-r16
                                                ENUMERATED {enabled}
                                                                                                            OPTIONAL.
                                                                                                                        -- Need S
                                                                                                                        -- Need R
harg-ProcessNumberSizeDCI-1-2-r16
                                                INTEGER (0..4)
                                                                                                            OPTIONAL,
mcs-TableDCI-1-2-r16
                                                ENUMERATED {gam256, gam64LowSE}
                                                                                                            OPTIONAL,
                                                                                                                        -- Need S
numberOfBitsForRV-DCI-1-2-r16
                                                INTEGER (0..2)
                                                                                                            OPTIONAL,
                                                                                                                        -- Need R
pdsch-TimeDomainAllocationListDCI-1-2-r16
                                                SetupRelease { PDSCH-TimeDomainResourceAllocationList-r16 }
                                                                                                            OPTIONAL,
                                                                                                                        -- Need M
prb-BundlingTypeDCI-1-2-r16
                                       CHOICE {
    staticBundling-r16
                                            SEOUENCE {
       bundleSize-r16
                                                ENUMERATED { n4, wideband }
                                                                                                            OPTIONAL
                                                                                                                        -- Need S
   dynamicBundling-r16
                                            SEOUENCE {
       bundleSizeSet1-r16
                                                ENUMERATED { n4, wideband, n2-wideband, n4-wideband }
                                                                                                            OPTIONAL.
                                                                                                                        -- Need S
       bundleSizeSet2-r16
                                                ENUMERATED { n4, wideband }
                                                                                                                        -- Need S
                                                                                                            OPTIONAL
                                                                                                            OPTIONAL,
                                                                                                                        -- Need R
priorityIndicatorDCI-1-2-r16
                                            ENUMERATED {enabled}
                                                                                                            OPTIONAL,
                                                                                                                        -- Need S
rateMatchPatternGroup1DCI-1-2-r16
                                            RateMatchPatternGroup
                                                                                                            OPTIONAL,
                                                                                                                        -- Need R
rateMatchPatternGroup2DCI-1-2-r16
                                           RateMatchPatternGroup
                                                                                                            OPTIONAL,
                                                                                                                        -- Need R
resourceAllocationType1GranularityDCI-1-2-r16 ENUMERATED {n2,n4,n8,n16}
                                                                                                            OPTIONAL,
                                                                                                                        -- Need S
vrb-ToPRB-InterleaverDCI-1-2-r16
                                           ENUMERATED {n2, n4}
                                                                                                            OPTIONAL,
                                                                                                                        -- Need S
referenceOfSLIVDCI-1-2-r16
                                            ENUMERATED {enabled}
                                                                                                            OPTIONAL,
                                                                                                                        -- Need S
resourceAllocationDCI-1-2-r16
                                            ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch}
                                                                                                            OPTIONAL, -- Need M
-- End of the parameters for DCI format 1 2 introduced in V16.1.0
priorityIndicatorDCI-1-1-r16
                                                                                                                        -- Need S
                                         ENUMERATED {enabled}
                                                                                                            OPTIONAL,
dataScramblingIdentityPDSCH2-r16
                                         INTEGER (0..1023)
                                                                                                            OPTIONAL,
                                                                                                                        -- Need R
pdsch-TimeDomainAllocationList-r16
                                         SetupRelease { PDSCH-TimeDomainResourceAllocationList-r16 }
                                                                                                            OPTIONAL,
                                                                                                                        -- Need M
repetitionSchemeConfig-r16
                                         SetupRelease { RepetitionSchemeConfig-r16}
                                                                                                            OPTIONAL
                                                                                                                        -- Need M
]],
11
                                         SetupRelease { RepetitionSchemeConfig-v1630}
repetitionSchemeConfig-v1630
                                                                                                            OPTIONAL
                                                                                                                        -- Need M
]],
[ [
                                             ENUMERATED {enabled}
pdsch-HARO-ACK-OneShotFeedbackDCI-1-2-r17
                                                                                                            OPTIONAL,
                                                                                                                        -- Need R
pdsch-HARO-ACK-EnhType3DCI-1-2-r17
                                             ENUMERATED {enabled}
                                                                                                            OPTIONAL,
                                                                                                                        -- Need R
                                                                                                                        -- Need R
                                             ENUMERATED {enabled}
pdsch-HARQ-ACK-EnhType3DCI-Field-1-2-r17
                                                                                                            OPTIONAL,
pdsch-HARQ-ACK-RetxDCI-1-2-r17
                                             ENUMERATED {enabled}
                                                                                                            OPTIONAL,
                                                                                                                        -- Need R
                                             ENUMERATED {enabled}
                                                                                                            OPTIONAL,
                                                                                                                       -- Need R
pucch-sSCellDynDCI-1-2-r17
dl-OrJointTCI-StateList-r17
                                             CHOICE {
    explicitlist
                                                 SEOUENCE {
       dl-OrJointTCI-StateToAddModList-r17
                                                   SEOUENCE (SIZE (1..maxNrofTCI-States)) OF TCI-State
                                                                                                            OPTIONAL,
                                                                                                                        -- Need N
       dl-OrJointTCI-StateToReleaseList-r17
                                                   SEQUENCE (SIZE (1..maxNrofTCI-States)) OF TCI-StateId
                                                                                                            OPTIONAL
                                                                                                                        -- Need N
   unifiedTCI-StateRef-r17
                                             ServingCellAndBWP-Id-r17
                                                                                                            OPTIONAL,
                                                                                                                        -- Need R
beamAppTime-r17
                                             ENUMERATED {n1, n2, n4, n7, n14, n28, n42, n56, n70, n84, n98, n112, n224, n336, spare2,
                                                                                                            OPTIONAL, -- Need R
                                                        spare1}
```

```
SetupRelease { Dummy-TDRA-List }
                                                                                                                    OPTIONAL, -- Need M
    dmrs-FD-OCC-DisabledForRank1-PDSCH-r17
                                                   ENUMERATED {true}
                                                                                                               OPTIONAL, -- Need R
                                                                                                                          -- Need M
    minimumSchedulingOffsetK0-r17
                                                   SetupRelease { MinSchedulingOffsetK0-Values-r17 }
                                                                                                               OPTIONAL.
                                                INTEGER (0..5)
                                                                                                                          -- Need R
    harg-ProcessNumberSizeDCI-1-2-v1700
                                                                                                               OPTIONAL,
                                                INTEGER (5)
    harg-ProcessNumberSizeDCI-1-1-r17
                                                                                                               OPTIONAL,
                                                                                                                          -- Need R
                                                                                                                          -- Need R
    mcs-Table-r17
                                                ENUMERATED {gam1024}
                                                                                                               OPTIONAL,
    mcs-TableDCI-1-2-r17
                                                ENUMERATED {gam1024}
                                                                                                               OPTIONAL,
                                                                                                                          -- Need R
                                                                                                               OPTIONAL, -- Need S
    xOverheadMulticast-r17
                                                ENUMERATED {x0h6, x0h12, x0h18}
    priorityIndicatorDCI-4-2-r17
                                                ENUMERATED {enabled}
                                                                                                               OPTIONAL, -- Need S
    sizeDCI-4-2-r17
                                                INTEGER (20..maxDCI-4-2-Size-r17)
                                                                                                               OPTIONAL
                                                                                                                           -- Need R
    ]],
    ] ]
    pdsch-TimeDomainAllocationListForMultiPDSCH-r17 SetupRelease { MultiPDSCH-TDRA-List-r17 }
                                                                                                               OPTIONAL
                                                                                                                           -- Need M
    11
RateMatchPatternGroup ::=
                                       SEQUENCE (SIZE (1..maxNrofRateMatchPatternsPerGroup)) OF CHOICE {
    cellLevel
                                           RateMatchPatternId,
    bwpLevel
                                           RateMatchPatternId
MinSchedulingOffsetK0-Values-r16 ::=
                                       SEQUENCE (SIZE (1..maxNrOfMinSchedulingOffsetValues-r16)) OF INTEGER (0..maxK0-SchedulingOffset-r16)
MinSchedulingOffsetK0-Values-r17 ::=
                                       SEQUENCE (SIZE (1..maxNrOfMinSchedulingOffsetValues-r16)) OF INTEGER (0..maxK0-SchedulingOffset-r17)
MaxMIMO-LayersDL-r16 ::=
                                       INTEGER (1..8)
-- TAG-PDSCH-CONFIG-STOP
-- ASN1STOP
```

PDSCH-Config field descriptions

antennaPortsFieldPresenceDCI-1-2

Configure the presence of "Antenna ports" field in DCI format 1_2. When the field is configured, then the "Antenna ports" field is present in DCI format 1_2. Otherwise, the field size is set to 0 for DCI format 1_2 (See TS 38.212 [17], clause 7.3.1.1.3). If neither dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2 nor dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2 is configured, this field is absent.

aperiodic-ZP-CSI-RS-ResourceSetsToAddModList, aperiodic-ZP-CSI-RS-ResourceSetsToAddModListDCI-1-2

AddMod/Release lists for configuring aperiodically triggered zero-power CSI-RS resource sets. Each set contains a ZP-CSI-RS-ResourceSetId and the IDs of one or more ZP-CSI-RS-Resources (the actual resources are defined in the zp-CSI-RS-ResourceToAddModList). The network configures the UE with at most 3 aperiodic ZP-CSI-RS-ResourceSets and it uses only the ZP-CSI-RS-ResourceSetId 1 to 3. The network triggers a set by indicating its ZP-CSI-RS-ResourceSetId in the DCI payload. The DCI codepoint '01' triggers the resource set with ZP-CSI-RS-ResourceSetId 2, and the DCI codepoint '11' triggers the resource set with ZP-CSI-RS-ResourceSetId 3 (see TS 38.214 [19], clause 5.1.4.2). The field aperiodic-ZP-CSI-RS-ResourceSetSToAddModList applies to DCI format 1_1 and the field aperiodic-ZP-CSI-RS-ResourceSetsToAddModListDCI-1-2 applies to DCI format 1_2 (see TS 38.214 [19], clause 5.1.4.2 and TS 38.212 [17] clause 7.3.1).

beamAppTime

Indicates the first slot to apply the unified TCI indicated by DCI as specified in TS 38.214 Clause 5.1.5. The value n1 means 1 symbol, n2 two symbols and so on. The first slot is at least Y symbols indicated by beamAppTime parameter after the last symbol of the acknowledgment of the joint or separate DL/UL beam indication. The same value shall be configured for all serving cells in any one of the *simultaneousU-TCI-UpdateListN* configured in IE *CellGroupConfig* based on the smallest SCS of the active BWP.

dataScramblingIdentityPDSCH, dataScramblingIdentityPDSCH2

Identifier(s) used to initialize data scrambling (c_init) for PDSCH as specified in TS 38.211 [16], clause 7.3.1.1. The *dataScramblingIdentityPDSCH2* is configured if *coresetPoolIndex* is configured with 1 for at least one CORESET in the same BWP.

dl-OrJointTCl-StateToAddModList

A list of Transmission Configuration Indicator (TCI) states indicating a transmission configuration which includes QCL-relationships between the DL RSs in one RS set and the PDSCH DMRS ports (see TS 38.214 [19], clause 5.1.5).

dmrs-DownlinkForPDSCH-MappingTypeA, dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2

DMRS configuration for PDSCH transmissions using PDSCH mapping type A (chosen dynamically via *PDSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-DownlinkForPDSCH-MappingTypeA* applies to DCI format 1_1 and the field *dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2* applies to DCI format 1_2 (see TS 38.212 [17], clause 7.3.1).

dmrs-DownlinkForPDSCH-MappingTypeB. dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2

DMRS configuration for PDSCH transmissions using PDSCH mapping type B (chosen dynamically via *PDSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-DownlinkForPDSCH-MappingTypeB* applies to DCI format 1_1 and the field *dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2* applies to DCI format 1_2 (see TS 38.212 [17], clause 7.3.1).

dmrs-FD-OCC-DisabledForRank1-PDSCH

If configured, the UE may assume that the set of remaining orthogonal antenna ports, which are within the same code division multiplexing (CDM) group and have different frequency domain orthogonal cover codes (FD-OCC), are not associated with the PDSCH of another UE (see TS 38.214 [19], clause 5.1.6.2). It is applicable for PDSCH SCS of 480 and 960 kHz when rank 1 PDSCH with type-1 or type-2 DMRS is scheduled.

dmrs-SequenceInitializationDCI-1_2

Configure whether the field "DMRS Sequence Initialization" is present or not in DCI format 1_2 If the field is absent, then the UE applies the value of 0 bit for the field "DMRS Sequence Initialization" in DCI format 1_2 (see TS 38.212 [17], clause 7.3.1).

dummv

This field is not used in the specification. If received it shall be ignored by the UE.

harg-ProcessNumberSizeDCI-1-2

Configure the number of bits for the field "HARQ process number" in DCI format 1_2 (see TS 38.212 [17], clause 7.3.1).

maxMIMO-Lavers

Indicates the maximum number of MIMO layers to be used for PDSCH in this DL BWP. If not configured, the UE uses the *maxMIMO-Layers* configuration in IE *PDSCH-ServingCellConfig* of the serving cell to which this BWP belongs, when the UE operates in this BWP. The value of *maxMIMO-Layers* for a DL BWP shall be smaller than or equal to the value of *maxMIMO-Layers* configured in IE *PDSCH-ServingCellConfig* of the serving cell to which this BWP belongs.

For MBS multicast, indicates the maximum number of MIMO layers to be used for group-common PDSCH of MBS multicast in this CFR. If not configured for CFR, the UE applies value 1. The value of *maxMIMO-Layers* for a CFR shall be smaller than or equal to the value of *maxMIMO-Layers* configured in *PDSCH-ServingCellConfig* IE of the serving cell to which this CFR belongs.

maxNrofCodeWordsScheduledByDCI

Maximum number of code words that a single DCI may schedule. This changes the number of MCS/RV/NDI bits in the DCI message from 1 to 2.

mcs-Table

Indicates which MCS table the UE shall use for PDSCH for DCI formats 1_0 and 1_1 (see TS 38.214 [19], clause 5.1.3.1). If all fields are absent the UE applies the value 64QAM. If the field *mcs-Table-r17* is present for DCI format 1_1, the network does not configure the field *mcs-Table* (without suffix). For a RedCap UE, the 256QAM MCS table for PDSCH is only supported if the UE indicates support of 256QAM for PDSCH.

mcs-TableDCI-1-2

Indicates which MCS table the UE shall use for PDSCH for DCI format 1_2 (see TS 38.214 [19], clause 5.1.3.1). If all fields are absent the UE applies the value 64QAM. If the field *mcs-TableDCI-1-2-r17* is present, the network does not configure the field *mcs-TableDCI-1-2-r16*. For a RedCap UE, the 256QAM MCS table for PDSCH is only supported if the UE indicates support of 256QAM for PDSCH.

minimumSchedulingOffsetK0

List of minimum K0 values. Minimum K0 parameter denotes minimum applicable value(s) for the TDRA table for PDSCH and for A-CSI RS triggering Offset(s) (see TS 38.214 [19], clause 5.3.1).

numberOfBitsForRV-DCI-1-2

Configures the number of bits for "Redundancy version" in the DCI format 1_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.2.1).

pdsch-AggregationFactor

Number of repetitions for data (see TS 38.214 [19], clause 5.1.2.1). When the field is absent in PDSCH-Config which is not used for MBS CFR, the UE applies the value 1.

pdsch-HARQ-ACK-EnhType3DCI-1-2

When configured, enhanced Type 3 HARQ-ACK codebook triggering by DCI format 1_2 is enabled.

pdsch-HARQ-ACK-EnhType3DCI-Field-1-2

Enables the enhanced Type 3 codebook through a new DCI field to indicate the enhanced Type 3 HARQ-ACK codebook in DCI format 1_2 if the more than one enhanced Type 3 HARQ-ACK codebook is configured for the primary PUCCH cell group.

pdsch-HARQ-ACK-OneShotFeedbackDCI-1-2

When configured, DCI format 1_2 can request the UE to report A/N for all HARQ processes and all component carriers configured in the PUCCH group (see TS 38.212 [17], clause 7.3.1).

pdsch-HARQ-ACK-RetxDCI-1-2

When configured, DCI format 1_2 can request the UE to perform a HARQ-ACK re-transmission on a PUCCH resource (see TS 38.213 [13], clause 9.1.5).

pdsch-TimeDomainAllocationList, pdsch-TimeDomainAllocationListDCI-1-2, pdsch-TimeDomainAllocationListForMultiPDSCH

List of time-domain configurations for timing of DL assignment to DL data.

The field pdsch-TimeDomainAllocationList (with or without suffix) applies to DCI format 1_0 and DCI format 1_1 (see table 5.1.2.1.1-1 in TS 38.214 [19]), and if the field pdsch-TimeDomainAllocationListDCI-1-2 is not configured, to DCI format 1_2 (see table 5.1.2.1.1-1A in TS 38.214 [19]). The field pdsch-TimeDomainAllocationListForMultiPDSCH applies to DCI format 1_1.

The network does not configure the pdsch-TimeDomainAllocationList-r16 simultaneously with the pdsch-TimeDomainAllocationList (without suffix) in the same PDSCH-Config.

prb-BundlingType, prb-BundlingTypeDCI-1-2

Indicates the PRB bundle type and bundle size(s) (see TS 38.214 [19], clause 5.1.2.3). If *dynamic* is chosen, the actual *bundleSizeSet1* or *bundleSizeSet2* to use is indicated via DCI. Constraints on *bundleSize(Set)* setting depending on *vrb-ToPRB-Interleaver* and *rbg-Size* settings are described in TS 38.214 [19], clause 5.1.2.3. If a *bundleSize(Set)* value is absent, the UE applies the value *n2*. The field *prb-BundlingType* applies to DCI format 1_1, and the field *prb-BundlingTypeDCI-1-2* applies to DCI format 1_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.2.3).

priorityIndicatorDCI-1-1, priorityIndicatorDCI-1-2, priorityIndicatorDCI-4-2

Configure the presence of "priority indicator" in DCI format 1_1/1_2/4_2. When the field is absent in the IE, then 0 bit for "priority indicator" in DCI format 1_1/1_2/4_2. The field priorityIndicatorDCI-1-1 applies to DCI format 1_1, the field priorityIndicatorDCI-1-2 applies to DCI format 1_2 and the field priorityIndicatorDCI-4-2 applies to DCI format 4_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9).

pucch-sSCellDynDCI-1-2

When configured, PUCCH cell switching based on dynamic indication in DCI format 1_2 is enabled (see TS 38.213 [13], clause 9.A).

p-ZP-CSI-RS-ResourceSet

A set of periodically occurring ZP-CSI-RS-Resources (the actual resources are defined in the zp-CSI-RS-ResourceToAddModList). The network uses the ZP-CSI-RS-ResourceSetId=0 for this set.

If p-ZP-CSI-RS-ResourceSet is configured in both PDSCH-Config for MBS CFR and PDSCH-Config for the assoicated BWP, it is subject to UE capability whether the p-ZP-CSI-RS-ResourceSet configured in PDSCH-Config for MBS CFR can be different from the p-ZP-CSI-RS-ResourceSet configured in PDSCH-Config for the assoicated BWP.

rateMatchPatternGroup1, rateMatchPatternGroup1DCI-1-2

The IDs of a first group of RateMatchPatterns defined in PDSCH-Config->rateMatchPatternToAddModList (BWP level) or in ServingCellConfig - >rateMatchPatternToAddModList (cell level). These patterns can be activated dynamically by DCI (see TS 38.214 [19], clause 5.1.4.1). The field rateMatchPatternGroup1 applies to DCI format 1 1, and the field rateMatchPatternGroup1DCI-1-2 applies to DCI format 1 2 (see TS 38.214 [19], clause 5.1.4.1).

rateMatchPatternGroup2, rateMatchPatternGroup2DCI-1-2

The IDs of a second group of *RateMatchPatterns* defined in *PDSCH-Config->rateMatchPatternToAddModList* (BWP level) or in *ServingCellConfig->rateMatchPatternToAddModList* (cell level). These patterns can be activated dynamically by DCI (see TS 38.214 [19], clause 5.1.4.1). The field *rateMatchPatternGroup2* applies to DCI format 1_1, and the field *rateMatchPatternGroup2DCI-1-2* applies to DCI format 1_2 (see TS 38.214 [19], clause 5.1.4.1).

rateMatchPatternToAddModList

Resources patterns which the UE should rate match PDSCH around. The UE rate matches around the union of all resources indicated in the rate match patterns (see TS 38.214 [19], clause 5.1.4.1). If a *RateMatchPattern* with the same *RateMatchPatternId* is configured in both MBS CFR and its associated BWP, the entire *RateMatchPattern* configuration, including the set of RBs/REs indicated by the patterns for the rate matching around, shall be the same and they are counted as a single rate match pattern in the total configured rate match patterns as defined in TS 38.214 [19].

rbg-Size

Selection between config 1 and config 2 for RBG size for PDSCH. The UE ignores this field if resourceAllocation is set to resourceAllocationType1 (see TS 38.214 [19], clause 5.1.2.2.1).

referenceOfSLIVDCI-1-2

Enable using the starting symbol of the PDCCH monitoring occasion in which the DL assignment is detected as the reference of the SLIV for DCI format 1_2. When the RRC parameter enables the utilization of the new reference, the new reference is applied for TDRA entries with K0=0. For other entries (if any) in the same TDRA table, the reference is slot boundary as in Rel-15. PDSCH mapping type A is not supported with the new reference. The new reference of SLIV is not configured for a serving cell configured to be scheduled by cross-carrier scheduling on a scheduling cell with different numerology (see TS 38.212 [17] clause 7.3.1 and TS 38.214 [19] clause 5.1.2.1).

repetitionSchemeConfia

Configure the UE with repetition schemes. The network does not configure repetitionSchemeConfig-r16 and repetitionSchemeConfig-v1630 simultaneously to setup in the same PDSCH-Config.

resourceAllocation, resourceAllocationDCI-1-2

Configuration of resource allocation type 0 and resource allocation type 1 for non-fallback DCI (see TS 38.214 [19], clause 5.1.2.2). The field resourceAllocation applies to DCI format 1 1, and the field resourceAllocationDCI-1-2 applies to DCI format 1 2 (see TS 38.214 [19], clause 5.1.2.2).

resourceAllocationType1GranularityDCI-1-2

Configure the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 1_2. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 5.1.2.2.2).

sizeDCI-4-2

Indicates the size of DCI format 4-2 (see TS 38.213 [13], clause 10.1).

sp-ZP-CSI-RS-ResourceSetsToAddModList

AddMod/Release lists for configuring semi-persistent zero-power CSI-RS resource sets. Each set contains a ZP-CSI-RS-ResourceSetId and the IDs of one or more ZP-CSI-RS-Resources (the actual resources are defined in the zp-CSI-RS-ResourceToAddModList) (see TS 38.214 [19], clause 5.1.4.2).

tci-StatesToAddModList

A list of Transmission Configuration Indicator (TCI) states indicating a transmission configuration which includes QCL-relationships between the DL RSs in one RS set and the PDSCH DMRS ports (see TS 38.214 [19], clause 5.1.5). If *unifiedTCI-StateType* is configured for the serving cell, no element in this list is configured.

unifiedTCI-StateRef

Provides the serving cell and BWP where the configuration for *dl-OrJointTCI-StateToAddModList-r17* are defined. When this field is present, *dl-OrJointTCI-StateToAddModList* and *dl-OrJointTCI-StateToReleaseList* are not present.

vrb-ToPRB-Interleaver, vrb-ToPRB-InterleaverDCI-1-2

Interleaving unit configurable between 2 and 4 PRBs (see TS 38.211 [16], clause 7.3.1.6). When the field is absent, the UE performs non-interleaved VRB-to-PRB mapping.

xOverheadMulticast

Accounts for an overhead from CSI-RS, CORESET etc. If the field is absent, the UE applies value xOh0 (see TS 38.214 [19]).

zp-CSI-RS-ResourceToAddModList

A list of Zero-Power (ZP) CSI-RS resources used for PDSCH rate-matching. Each resource in this list may be referred to from only one type of resource set, i.e., aperiodic, semi-persistent or periodic (see TS 38.214 [19]).

PDSCH-ConfigCommon

The IE *PDSCH-ConfigCommon* is used to configure cell specific PDSCH parameters.

PDSCH-ConfigCommon information element

PDSCH-ConfigCommon field descriptions

pdsch-TimeDomainAllocationList

List of time-domain configurations for timing of DL assignment to DL data (see table 5.1.2.1.1-1 in TS 38.214 [19]).

– PDSCH-ServingCellConfig

The IE PDSCH-Serving CellConfig is used to configure UE specific PDSCH parameters that are common across the UE's BWPs of one serving cell.

PDSCH-ServingCellConfig information element

```
-- ASN1START
```

⁻⁻ TAG-PDSCH-SERVINGCELLCONFIG-START

```
PDSCH-ServingCellConfig ::=
                                        SEOUENCE {
    codeBlockGroupTransmission
                                            SetupRelease { PDSCH-CodeBlockGroupTransmission }
                                                                                                           OPTIONAL.
                                                                                                                       -- Need M
                                            ENUMERATED { x0h6, x0h12, x0h18 }
                                                                                                                       -- Need S
    xOverhead
                                                                                                           OPTIONAL.
                                            ENUMERATED {n2, n4, n6, n10, n12, n16}
                                                                                                                       -- Need S
   nrofHARO-ProcessesForPDSCH
                                                                                                           OPTIONAL,
   pucch-Cell
                                            ServCellIndex
                                                                                                           OPTIONAL.
                                                                                                                       -- Cond SCellAddOnly
    . . . ,
    ] ]
    maxMIMO-Lavers
                                            INTEGER (1..8)
                                                                                                           OPTIONAL,
                                                                                                                       -- Need M
    processingType2Enabled
                                            BOOLEAN
                                                                                                           OPTIONAL
                                                                                                                       -- Need M
    ]],
    ] ]
    pdsch-CodeBlockGroupTransmissionList-r16 SetupRelease { PDSCH-CodeBlockGroupTransmissionList-r16 }
                                                                                                           OPTIONAL
                                                                                                                       -- Need M
    11,
    ] ]
    downlinkHARO-FeedbackDisabled-r17
                                            SetupRelease { DownlinkHARO-FeedbackDisabled-r17 }
                                                                                                            OPTIONAL,
                                                                                                                       -- Need M
                                                                                                                       -- Need R
    nrofHARO-ProcessesForPDSCH-v1700
                                            ENUMERATED {n32}
                                                                                                           OPTIONAL
    ]]
PDSCH-CodeBlockGroupTransmission ::=
                                       SEQUENCE {
    maxCodeBlockGroupsPerTransportBlock
                                            ENUMERATED {n2, n4, n6, n8},
    codeBlockGroupFlushIndicator
                                            BOOLEAN,
PDSCH-CodeBlockGroupTransmissionList-r16 ::=
                                              SEQUENCE (SIZE (1..2)) OF PDSCH-CodeBlockGroupTransmission
DownlinkHARO-FeedbackDisabled-r17 ::= BIT STRING (SIZE (32))
-- TAG-PDSCH-SERVINGCELLCONFIG-STOP
-- ASN1STOP
```

PDSCH-CodeBlockGroupTransmission field descriptions

codeBlockGroupFlushIndicator

Indicates whether CBGFI for CBG based (re)transmission in DL is enabled (true). (see TS 38.212 [17], clause 7.3.1.2.2).

maxCodeBlockGroupsPerTransportBlock

Maximum number of code-block-groups (CBGs) per TB. In case of multiple CW, the maximum CBG is 4 (see TS 38.213 [13], clause 9.1.1).

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PDSCH-ServingCellConfig field descriptions

codeBlockGroupTransmission

Enables and configures code-block-group (CBG) based transmission (see TS 38.213 [13], clause 9.1.1). Network does not configure for a UE both spatial bundling of HARQ ACKs and *codeBlockGroupTransmission* within the same cell group.

The network does not configure this field if

- the SCS is 480 or 960 kHz
- Type-1 HARQ-ACK codebook is configured and pdsch-TimeDomainAllocationListForMultiPDSCH-r17 for this serving cell contains pdsch-AllocationList with multiple entries (multiple PDSCH)
- Type-2 HARQ-ACK codebook is configured and pdsch-TimeDomainAllocationListForMultiPDSCH-r17 for any cell in the same PUCCH cell group associated with this serving cell contains pdsch-AllocationList with multiple entries (multiple PDSCH)

downlinkHARQ-FeedbackDisabled

Used to disable the DL HARQ feedback, sent in the uplink, per HARQ process ID. The first/leftmost bit corresponds to HARQ process ID 0, the next bit to HARQ process ID 1 and so on. Bits corresponding to HARQ process IDs that are not configured shall be ignored. The bit(s) set to one identify HARQ processes with disabled DL HARQ feedback and the bit(s) set to zero identify HARQ processes with enabled DL HARQ feedback.

maxMIMO-Layers

Indicates the maximum number of MIMO layers to be used for PDSCH in all BWPs of this serving cell. (see TS 38.212 [17], clause 5.4.2.1).

nrofHARQ-ProcessesForPDSCH

The number of HARQ processes to be used on the PDSCH of a serving cell. Value *n*2 corresponds to 2 HARQ processes, value *n*4 to 4 HARQ processes, and so on. If both *nrofHARQ-ProcessesForPDSCH* and *nrofHARQ-ProcessesForPDSCH-v1700* are absent, the UE uses 8 HARQ processes (see TS 38.214 [19], clause 5.1).

pdsch-CodeBlockGroupTransmissionList

A list of configurations for up to two simultaneously constructed HARQ-ACK codebooks (see TS 38.213 [13], clause 9.3).

processingType2Enabled

Enables configuration of advanced processing time capability 2 for PDSCH (see 38.214 [19], clause 5.3).

pucch-Cell

The ID of the serving cell (of the same cell group) to use for PUCCH. If the field is absent, the UE sends the HARQ feedback on the PUCCH of the SpCell of this cell group, or on this serving cell if it is a PUCCH SCell.

xOverhead

Accounts for overhead from CSI-RS, CORESET, etc. If the field is absent, the UE applies value xOh0 (see TS 38.214 [19], clause 5.1.3.2).

Conditional Presence	Explanation
SCellAddOnly	It is optionally present, Need S, for (non-PUCCH) SCells when adding a new SCell. The field is absent, Need M, when
	reconfiguring SCells. The field is also absent for the SpCells as well as for a PUCCH SCell.

PDSCH-TimeDomainResourceAllocationList

The IE *PDSCH-TimeDomainResourceAllocation* is used to configure a time domain relation between PDCCH and PDSCH. The *PDSCH-TimeDomainResourceAllocationList* contains one or more of such *PDSCH-TimeDomainResourceAllocations*. The network indicates in the DL assignment which of the configured time domain allocations the UE shall apply for that DL assignment. The UE determines the bit width of the DCI field based on the number of entries in the *PDSCH-TimeDomainResourceAllocationList*. Value 0 in the DCI field refers to the first element in this list, value 1 in the DCI field refers to the second element in this list, and so on.

PDSCH-TimeDomainResourceAllocationList information element

- -- ASN1START
- -- TAG-PDSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-START

```
PDSCH-TimeDomainResourceAllocationList ::= SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation
PDSCH-TimeDomainResourceAllocation ::= SEQUENCE {
                                           INTEGER(0..32)
                                                                                                           OPTIONAL, -- Need S
   mappingType
                                           ENUMERATED {typeA, typeB},
    startSymbolAndLength
                                           INTEGER (0..127)
PDSCH-TimeDomainResourceAllocationList-r16 ::= SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation-r16
PDSCH-TimeDomainResourceAllocation-r16 ::= SEOUENCE {
   k0-r16
                                              INTEGER (0..32)
                                                                                                          OPTIONAL. -- Need S
                                              ENUMERATED {typeA, typeB},
    mappingType-r16
    startSymbolAndLength-r16
                                             INTEGER (0..127),
    repetitionNumber-r16
                                              ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16}
                                                                                                          OPTIONAL,
                                                                                                                      -- Cond Formats1-0and1-1
    ] ]
   k0-v1710
                                           INTEGER(33..128)
                                                                                                          OPTIONAL
                                                                                                                      -- Need S
    11,
    11
   repetitionNumber-v1730
                                           ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16}
                                                                                                          OPTIONAL -- Cond Format1-2
    11
Dummy-TDRA-List ::= SEOUENCE (SIZE(1.. maxNrofDL-Allocations)) OF MultiPDSCH-TDRA-r17
MultiPDSCH-TDRA-List-r17 ::= SEQUENCE (SIZE(1.. maxNrofDL-AllocationsExt-r17)) OF MultiPDSCH-TDRA-r17
MultiPDSCH-TDRA-r17 ::= SEOUENCE {
    pdsch-TDRA-List-r17
                                       SEQUENCE (SIZE(1..maxNrofMultiplePDSCHs-r17)) OF PDSCH-TimeDomainResourceAllocation-r16,
    . . .
-- TAG-PDSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-STOP
-- ASN1STOP
```

PDSCH-TimeDomainResourceAllocation field descriptions

ĸυ

Slot offset between DCI and its scheduled PDSCH (see TS 38.214 [19], clause 5.1.2.1). k0-v1710 is only applicable for PDSCH SCS of 480 kHz and 960 kHz. When the field is absent the UE applies the value 0.

mappingType

PDSCH mapping type (see TS 38.214 [19], clause 5.3).

repetitionNumber

Indicates the number of PDSCH transmission occasions for slot-based repetition scheme in IE RepetitionSchemeConfig. The parameter is used as specified in 38.214 [19].

startSymbolAndLength

An index giving valid combinations of start symbol and length (jointly encoded) as start and length indicator (SLIV). The network configures the field so that the allocation does not cross the slot boundary (see TS 38.214 [19], clause 5.1.2.1).

MultiPDSCH-TimeDomainResourceAllocation field descriptions		
pdsch-TDRA-List		
One or multiple PDSCHs which can be in consecutive or non-consecutive slots (see TS 38.214 [19], clause 5.1.2.1).		

Conditional Presence	Explanation
Format1-2	In pdsch-TimeDomainAllocationListDCI-1-2, this field is optionally present, Need R. It is absent, Need R, otherwise.
Formats1-0and1-1	In pdsch-TimeDomainAllocationListDCI-1-2, pdsch-TimeDomainAllocationListForMultiPDSCH, and SIB20, this field is absent. Otherwise, in pdsch-TimeDomainResourceAllocationList-r16 and pdsch-TimeDomainResourceAllocationList-r17, this field is optionally present, Need R.

- PHR-Config

The IE *PHR-Config* is used to configure parameters for power headroom reporting.

PHR-Config information element

```
-- ASN1START
-- TAG-PHR-CONFIG-START
PHR-Config ::=
                                    SEQUENCE {
    phr-PeriodicTimer
                                        ENUMERATED {sf10, sf20, sf50, sf100, sf200, sf500, sf1000, infinity},
                                        ENUMERATED {sf0, sf10, sf20, sf50, sf100, sf200, sf500, sf1000},
    phr-ProhibitTimer
    phr-Tx-PowerFactorChange
                                        ENUMERATED {dB1, dB3, dB6, infinity},
    multiplePHR
                                        BOOLEAN,
    dummy
                                        BOOLEAN,
    phr-Type2OtherCell
                                        BOOLEAN,
                                        ENUMERATED {real, virtual},
    phr-ModeOtherCG
    mpe-Reporting-FR2-r16
                                        SetupRelease { MPE-Config-FR2-r16 }
                                                                                                 OPTIONAL
                                                                                                              -- Need M
    11,
                                        SetupRelease { MPE-Config-FR2-r17 }
    mpe-Reporting-FR2-r17
                                                                                                 OPTIONAL,
                                                                                                               -- Need M
                                        ENUMERATED {enabled}
    twoPHRMode-r17
                                                                                                 OPTIONAL
                                                                                                              -- Need R
    ]]
MPE-Config-FR2-r16 ::=
                                    SEOUENCE
    mpe-ProhibitTimer-r16
                                        ENUMERATED {sf0, sf10, sf20, sf50, sf100, sf200, sf500, sf1000},
    mpe-Threshold-r16
                                        ENUMERATED {dB3, dB6, dB9, dB12}
MPE-Config-FR2-r17 ::=
                                    SEQUENCE {
    mpe-ProhibitTimer-r17
                                        ENUMERATED {sf0, sf10, sf20, sf50, sf100, sf200, sf500, sf1000},
                                        ENUMERATED {dB3, dB6, dB9, dB12},
    mpe-Threshold-r17
    numberOfN-r17
                                        INTEGER(1..4),
    . . .
```

```
}
-- TAG-PHR-CONFIG-STOP
-- ASN1STOP
```

PHR-Config field descriptions

dummy

This field is not used in this version of the specification and the UE ignores the received value.

mpe-ProhibitTimer

Value in number of subframes for MPE reporting, as specified in TS 38.321 [3]. Value sf10 corresponds to 10 subframes, and so on.

mpe-Reporting-FR2

Indicates whether the UE shall report MPE P-MPR in the PHR MAC control element, as specified in TS 38.321 [3].

mpe-Threshold

Value of the P-MPR threshold in dB for reporting MPE P-MPR when FR2 is configured, as specified in TS 38.321 [3]. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).

multiplePHR

Indicates if power headroom shall be reported using the Single Entry PHR MAC control element or Multiple Entry PHR MAC control element defined in TS 38.321 [3]. True means to use Multiple Entry PHR MAC control element and False means to use the Single Entry PHR MAC control element defined in TS 38.321 [3]. The network configures this field to *true* for MR-DC and UL CA for NR, and to *false* in all other cases.

numberOfN

Number of reported P-MPR values in a PHR MAC CE.

phr-ModeOtherCG

Indicates the mode (i.e. real or virtual) used for the PHR of the activated cells that are part of the other Cell Group (i.e. MCG or SCG), when DC is configured. If the UE is configured with only one cell group (no DC), it ignores the field.

phr-PeriodicTimer

Value in number of subframes for PHR reporting as specified in TS 38.321 [3]. Value sf10 corresponds to 10 subframes, value sf20 corresponds to 20 subframes, and so on.

phr-ProhibitTimer

Value in number of subframes for PHR reporting as specified in TS 38.321 [3]. Value *sf0* corresponds to 0 subframe, value *sf10* corresponds to 10 subframes, value *sf20* corresponds to 20 subframes, and so on.

phr-Tx-PowerFactorChange

Value in dB for PHR reporting as specified in TS 38.321 [3]. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).

phr-Type2OtherCell

If set to true, the UE shall report a PHR type 2 for the SpCell of the other MAC entity. See TS 38.321 [3], clause 5.4.6. Network sets this field to false if the UE is not configured with an E-UTRA MAC entity.

twoPHRMode

Indicates if the power headroom shall be reported as two PHRs (each PHR associated with a SRS resource set) is enabled or not.

– PhysCellId

The PhysCellId identifies the physical cell identity (PCI).

PhysCellId information element

```
-- ASN1START
-- TAG-PHYSCELLID-START

PhysCellid ::= INTEGER (0..1007)

-- TAG-PHYSCELLID-STOP
-- ASN1STOP
```

PhysicalCellGroupConfig

The IE *PhysicalCellGroupConfig* is used to configure cell-group specific L1 parameters.

PhysicalCellGroupConfig information element

```
-- ASN1START
-- TAG-PHYSICALCELLGROUPCONFIG-START
PhysicalCellGroupConfig ::=
                                    SEOUENCE {
    harg-ACK-SpatialBundlingPUCCH
                                        ENUMERATED {true}
                                                                                                         OPTIONAL,
                                                                                                                    -- Need S
    harg-ACK-SpatialBundlingPUSCH
                                        ENUMERATED {true}
                                                                                                         OPTIONAL,
                                                                                                                   -- Need S
                                                                                                                    -- Need R
    p-NR-FR1
                                                                                                         OPTIONAL,
                                        P-Max
    pdsch-HARQ-ACK-Codebook
                                        ENUMERATED {semiStatic, dynamic},
                                        RNTI-Value
                                                                                                         OPTIONAL,
    tpc-SRS-RNTI
                                                                                                                   -- Need R
                                        RNTI-Value
                                                                                                         OPTIONAL, -- Need R
    tpc-PUCCH-RNTI
                                        RNTI-Value
                                                                                                                    -- Need R
    tpc-PUSCH-RNTI
                                                                                                         OPTIONAL,
                                        RNTI-Value
    sp-CSI-RNTI
                                                                                                         OPTIONAL,
                                                                                                                   -- Need R
    cs-RNTI
                                        SetupRelease { RNTI-Value }
                                                                                                         OPTIONAL,
                                                                                                                    -- Need M
    mcs-C-RNTI
                                        RNTI-Value
                                                                                                         OPTIONAL,
                                                                                                                     -- Need R
    p-UE-FR1
                                        P-Max
                                                                                                         OPTIONAL
                                                                                                                     -- Cond MCG-Only
    ]],
    11
    xScale
                                        ENUMERATED {dB0, dB6, spare2, spare1}
                                                                                                         OPTIONAL
                                                                                                                     -- Cond SCG-Only
    ]],
                                        SetupRelease { PDCCH-BlindDetection }
    pdcch-BlindDetection
                                                                                                         OPTIONAL
                                                                                                                     -- Need M
    ]],
    [ [
    dcp-Config-r16
                                        SetupRelease { DCP-Config-r16 }
                                                                                                         OPTIONAL,
                                                                                                                    -- Need M
    harq-ACK-SpatialBundlingPUCCH-secondaryPUCCHgroup-r16
                                                             ENUMERATED {enabled, disabled}
                                                                                                         OPTIONAL, -- Cond twoPUCCHgroup
    harg-ACK-SpatialBundlingPUSCH-secondaryPUCCHgroup-r16
                                                             ENUMERATED {enabled, disabled}
                                                                                                         OPTIONAL, -- Cond twoPUCCHgroup
    pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup-r16
                                                             ENUMERATED {semiStatic, dynamic}
                                                                                                         OPTIONAL, -- Cond twoPUCCHgroup
    p-NR-FR2-r16
                                                              P-Max
                                                                                                         OPTIONAL, -- Need R
    p-UE-FR2-r16
                                                              P-Max
                                                                                                         OPTIONAL, -- Cond MCG-Only
    nrdc-PCmode-FR1-r16
                                       ENUMERATED {semi-static-model, semi-static-mode2, dynamic}
                                                                                                         OPTIONAL, -- Cond MCG-Only
    nrdc-PCmode-FR2-r16
                                       ENUMERATED {semi-static-model, semi-static-mode2, dynamic}
                                                                                                         OPTIONAL, -- Cond MCG-Only
    pdsch-HARO-ACK-Codebook-r16
                                           ENUMERATED {enhancedDynamic}
                                                                                                         OPTIONAL, -- Need R
    nfi-TotalDAI-Included-r16
                                                                                                         OPTIONAL, -- Need R
                                           ENUMERATED {true}
```

```
ul-TotalDAI-Included-r16
                                      ENUMERATED {true}
                                                                                                  OPTIONAL,
                                                                                                              -- Need R
pdsch-HARO-ACK-OneShotFeedback-r16
                                      ENUMERATED
                                                 {true}
                                                                                                  OPTIONAL,
                                                                                                              -- Need R
pdsch-HARO-ACK-OneShotFeedbackNDI-r16 ENUMERATED
                                                 {true}
                                                                                                  OPTIONAL.
                                                                                                              -- Need R
pdsch-HARO-ACK-OneShotFeedbackCBG-r16 ENUMERATED {true}
                                                                                                  OPTIONAL,
                                                                                                             -- Need R
downlinkAssignmentIndexDCI-0-2-r16
                                      ENUMERATED { enabled }
                                                                                                  OPTIONAL,
                                                                                                             -- Need S
                                      ENUMERATED {n1, n2, n4}
                                                                                                              -- Need S
downlinkAssignmentIndexDCI-1-2-r16
                                                                                                  OPTIONAL,
pdsch-HARO-ACK-CodebookList-r16
                                      SetupRelease {PDSCH-HARO-ACK-CodebookList-r16}
                                                                                                             -- Need M
                                                                                                  OPTIONAL,
ackNackFeedbackMode-r16
                                      ENUMERATED { joint, separate}
                                                                                                  OPTIONAL,
                                                                                                            -- Need R
pdcch-BlindDetectionCA-CombIndicator-r16 SetupRelease { PDCCH-BlindDetectionCA-CombIndicator-r16 } OPTIONAL, -- Need M
                                        SetupRelease { PDCCH-BlindDetection2-r16 }
pdcch-BlindDetection2-r16
                                                                                                  OPTIONAL,
                                                                                                             -- Need M
pdcch-BlindDetection3-r16
                                        SetupRelease { PDCCH-BlindDetection3-r16 }
                                                                                                  OPTIONAL,
                                                                                                             -- Need M
bdFactorR-r16
                                      ENUMERATED {n1}
                                                                                                  OPTIONAL
                                                                                                              -- Need R
11,
П
-- start of enhanced Type3 feedback
pdsch-HARO-ACK-EnhType3ToAddModList-r17
                                        SEOUENCE (SIZE(1..maxNrofEnhType3HARO-ACK-r17)) OF PDSCH-HARO-ACK-EnhType3-r17
                                                                                                  OPTIONAL, -- Need N
pdsch-HARO-ACK-EnhType3ToReleaseList-r17 SEOUENCE (SIZE(1..maxNrofEnhType3HARO-ACK-r17)) OF PDSCH-HARO-ACK-EnhType3Index-r17
                                                                                                  OPTIONAL,
pdsch-HARQ-ACK-EnhType3SecondaryToAddModList-r17 SEQUENCE (SIZE(1..maxNrofEnhType3HARQ-ACK-r17)) OF PDSCH-HARQ-ACK-EnhType3-r17
                                                                                                  OPTIONAL,
                                                                                                              -- Need N
pdsch-HARQ-ACK-EnhType3SecondaryToReleaseList-r17 SEQUENCE (SIZE(1..maxNrofEnhType3HARQ-ACK-r17)) OF PDSCH-HARQ-ACK-EnhType3Index-r17
                                                                                                  OPTIONAL,
                                                                                                            -- Need N
pdsch-HARQ-ACK-EnhType3DCI-FieldSecondaryPUCCHgroup-r17 ENUMERATED {enabled}
                                                                                                  OPTIONAL, -- Cond twoPUCCHgroup
pdsch-HARO-ACK-EnhType3DCI-Field-r17
                                                   ENUMERATED {enabled}
                                                                                                  OPTIONAL, -- Need R
-- end of enhanced Type3 feedback
-- start of triggering of HARQ-ACK re-transmission on a PUCCH resource
                                         ENUMERATED {enabled}
pdsch-HARO-ACK-Retx-r17
                                                                                                  OPTIONAL,
                                                                                                              -- Need R
OPTIONAL,
                                                                                                             -- Cond twoPUCCHgroup
-- end of triggering of HARQ-ACK re-transmission on a PUCCH resource
-- start of PUCCH Cell switching
pucch-sSCell-r17
                                        SCellIndex
                                                                                                     OPTIONAL, -- Need R
pucch-sSCellSecondaryPUCCHgroup-r17
                                        SCellIndex
                                                                                                     OPTIONAL, -- Cond twoPUCCHgroup
pucch-sSCellDyn-r17
                                        ENUMERATED {enabled}
                                                                                                  OPTIONAL, -- Need R
pucch-sSCellDynSecondaryPUCCHgroup-r17
                                        ENUMERATED {enabled}
                                                                                                  OPTIONAL, -- Cond twoPUCCHgroup
                                            SEQUENCE (SIZE(1..maxNrofSlots)) OF INTEGER (0..1)
                                                                                                     OPTIONAL, -- Need R
pucch-sSCellPattern-r17
                                           SEQUENCE (SIZE(1..maxNrofSlots)) OF INTEGER (0..1)
pucch-sSCellPatternSecondaryPUCCHgroup-r17
                                                                                                     OPTIONAL, -- Cond twoPUCCHgroup
-- end of PUCCH Cell switching
uci-MuxWithDiffPrio-r17
                                 ENUMERATED {enabled}
                                                                                          OPTIONAL,
                                                                                                      -- Need R
                                              ENUMERATED {enabled}
                                                                                          OPTIONAL,
uci-MuxWithDiffPrioSecondaryPUCCHgroup-r17
                                                                                                      -- Cond twoPUCCHgroup
                                 ENUMERATED {enabled}
simultaneousPUCCH-PUSCH-r17
                                                                                          OPTIONAL,
                                                                                                      -- Need R
                                                    ENUMERATED {enabled}
simultaneousPUCCH-PUSCH-SecondaryPUCCHgroup-r17
                                                                                          OPTIONAL,
                                                                                                      -- Cond twoPUCCHaroup
prioLowDG-HighCG-r17
                                 ENUMERATED {enabled}
                                                                                          OPTIONAL,
                                                                                                      -- Need R
                                 ENUMERATED {enabled}
                                                                                                      -- Need R
prioHighDG-LowCG-r17
                                                                                          OPTIONAL,
twoQCLTypeDforPDCCHRepetition-r17 ENUMERATED {enabled}
                                                                                          OPTIONAL.
                                                                                                      -- Need R
                                 SetupRelease { MulticastConfig-r17 }
multicastConfig-r17
                                                                                          OPTIONAL,
                                                                                                     -- Need M
pdcch-BlindDetectionCA-CombIndicator-r17 SetupRelease { PDCCH-BlindDetectionCA-CombIndicator-r17 } OPTIONAL -- Need M
]],
] ]
                                              ENUMERATED {enabled}
simultaneousSR-PUSCH-diffPUCCH-Groups-r17
                                                                                          OPTIONAL
                                                                                                      -- Cond twoPUCCHgroup
```

```
]],
    ΓΓ
    intraBandNC-PRACH-simulTx-r17
                                      ENUMERATED {enabled}
                                                                                                 OPTIONAL
                                                                                                             -- Need R
    11
PDSCH-HARQ-ACK-EnhType3-r17 ::=
                                        SEOUENCE {
    pdsch-HARQ-ACK-EnhType3Index-r17
                                        PDSCH-HARQ-ACK-EnhType3Index-r17,
    applicable-r17 CHOICE {
       perCC
                                         SEQUENCE (SIZE (1..maxNrofServingCells)) OF INTEGER (0..1),
                                         SEQUENCE (SIZE (1..maxNrofServingCells)) OF BIT STRING (SIZE (16))
        perHARQ
    pdsch-HARQ-ACK-EnhType3NDI-r17
                                           ENUMERATED {true}
                                                                                                         OPTIONAL.
                                                                                                                    -- Need R
    pdsch-HARQ-ACK-EnhType3CBG-r17
                                           ENUMERATED {true}
                                                                                                         OPTIONAL, -- Need S
PDSCH-HARO-ACK-EnhType3Index-r17 ::=
                                        INTEGER (0..maxNrofEnhType3HARO-ACK-1-r17)
PDCCH-BlindDetection ::=
                                        INTEGER (1..15)
DCP-Config-r16 ::=
                                    SEQUENCE {
    ps-RNTI-r16
                                        RNTI-Value,
   ps-Offset-r16
                                        INTEGER (1..120),
    sizeDCI-2-6-r16
                                        INTEGER (1..maxDCI-2-6-Size-r16),
    ps-PositionDCI-2-6-r16
                                        INTEGER (0..maxDCI-2-6-Size-1-r16),
   ps-WakeUp-r16
                                        ENUMERATED {true}
                                                                                                         OPTIONAL,
                                                                                                                     -- Need S
                                        ENUMERATED {true}
                                                                                                                    -- Need S
    ps-TransmitPeriodicL1-RSRP-r16
                                                                                                         OPTIONAL,
                                        ENUMERATED {true}
    ps-TransmitOtherPeriodicCSI-r16
                                                                                                         OPTIONAL
                                                                                                                     -- Need S
PDSCH-HARQ-ACK-CodebookList-r16 ::=
                                        SEQUENCE (SIZE (1..2)) OF ENUMERATED {semiStatic, dynamic}
PDCCH-BlindDetectionCA-CombIndicator-r16 ::= SEQUENCE {
    pdcch-BlindDetectionCA1-r16
                                                 INTEGER (1..15),
    pdcch-BlindDetectionCA2-r16
                                                 INTEGER (1..15)
PDCCH-BlindDetection2-r16 ::=
                                             INTEGER (1..15)
PDCCH-BlindDetection3-r16 ::=
                                             INTEGER (1..15)
MulticastConfig-r17 ::=
                                        SEOUENCE {
    pdsch-HARQ-ACK-CodebookListMulticast-r17
                                                SetupRelease { PDSCH-HARO-ACK-CodebookList-r16}
                                                                                                         OPTIONAL,
                                                                                                                   -- Need M
    type1-Codebook-GenerationMode-r17
                                                ENUMERATED { mode1, mode2}
                                                                                                         OPTIONAL
                                                                                                                     -- Need M
PDCCH-BlindDetectionCA-CombIndicator-r17 ::= SEQUENCE {
    pdcch-BlindDetectionCA1-r17
                                                 INTEGER (1..15)
                                                                                                         OPTIONAL,
                                                                                                                     -- Need R
    pdcch-BlindDetectionCA2-r17
                                                 INTEGER (1..15)
                                                                                                         OPTIONAL,
                                                                                                                    -- Need R
    pdcch-BlindDetectionCA3-r17
                                                 INTEGER (1..15)
```

- -- TAG-PHYSICALCELLGROUPCONFIG-STOP
- -- ASN1STOP

PhysicalCellGroupConfig field descriptions

ackNackFeedbackMode

Indicates which among the joint and separate ACK/NACK feedback modes to use within a slot as specified in TS 38.213 [13] (clause 9).

bdFactorR

Parameter for determining and distributing the maximum numbers of BD/CCE for mPDCCH based mPDSCH transmission as specified in TS 38.213 [13] Clause 10.1.

cs-RNTI

RNTI value for downlink SPS (see SPS-Config) and uplink configured grant (see ConfiguredGrantConfig).

downlinkAssignmentIndexDCI-0-2

Indicates if "Downlink assignment index" is present or absent in DCI format 0_2. If the field "downlinkAssignmentIndexDCI-0-2" is absent, then 0 bit for "Downlink assignment index" in DCI format 0_2. If the field "downlinkAssignmentIndexDCI-0-2" is present, then the bitwidth of "Downlink assignment index" in DCI format 0_2 is defined in the same was as that in DCI format 0_1 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.1).

downlinkAssignmentIndexDCI-1-2

Configures the number of bits for "Downlink assignment index" in DCI format 1_2. If the field is absent, then 0 bit for "Downlink assignment index" in DCI format 1_2. Note that 1 bit and 2 bits are applied if only one serving cell is configured in the DL and *pdsch-HARQ-ACK-Codebook*= is set to *dynamic*. 4 bits is applied if more than one serving cell are configured in the DL and *pdsch-HARQ-ACK-Codebook* is set to *dynamic* (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.1).

harg-ACK-SpatialBundlingPUCCH

Enables spatial bundling of HARQ ACKs. It is configured per cell group (i.e. for all the cells within the cell group) for PUCCH reporting of HARQ-ACK. It is only applicable when more than 4 layers are possible to schedule. When the field is absent, the spatial bundling of PUCCH HARQ ACKs for the primary PUCCH group is disabled (see TS 38.213 [13], clause 9.1.2.1). If the field *harq-ACK SpatialBundlingPUCCH-secondaryPUCCH group* is present, *harq-ACK-SpatialBundlingPUCCH* is only applied to primary PUCCH group. Network does not configure for a UE both spatial bundling of HARQ ACKs and *codeBlockGroupTransmission* within the same cell group.

harg-ACK-SpatialBundlingPUCCH-secondaryPUCCHgroup

Indicates whether spatial bundling of PUCCH HARQ ACKs for the secondary PUCCH group is enabled or disabled. The field is only applicable when more than 4 layers are possible to schedule (see TS 38.213 [13], clause 9.1.2.1). When the field is absent, the use of spatial bundling of PUCCH HARQ ACKs for the secondary PUCCH group is indicated by *harq-ACK-SpatialBundlingPUCCH*. See TS 38.213 [13], clause 9.1.2.1. Network does not configure for a UE both spatial bundling of HARQ ACKs and *codeBlockGroupTransmission* within the same cell group.

harg-ACK-SpatialBundlingPUSCH

Enables spatial bundling of HARQ ACKs. It is configured per cell group (i.e. for all the cells within the cell group) for PUSCH reporting of HARQ-ACK. It is only applicable when more than 4 layers are possible to schedule. When the field is absent, the spatial bundling of PUSCH HARQ ACKs for the primary PUCCH group is disabled (see TS 38.213 [13], clauses 9.1.2.2 and 9.1.3.2). If the field *harq-ACK SpatialBundlingPUSCH-secondaryPUCCHgroup* is present, *harq-ACK-SpatialBundlingPUSCH* is only applied to primary PUCCH group. Network does not configure for a UE both spatial bundling of HARQ ACKs and *codeBlockGroupTransmission* within the same cell group.

harq-ACK-SpatialBundlingPUSCH-secondaryPUCCHgroup

Indicates whether spatial bundling of PUSCH HARQ ACKs for the secondary PUCCH group is enabled or disabled. The field is only applicable when more than 4 layers are possible to schedule (see TS 38.213 [13], clauses 9.1.2.2 and 9.1.3.2). When the field is absent, the use of spatial bundling of PUSCH HARQ ACKs for the secondary PUCCH group is indicated by *harq-ACK-SpatialBundlingPUSCH*. See TS 38.213 [13], clauses 9.1.2.2 and 9.1.3.2. Network does not configure for a UE both spatial bundling of HARQ ACKs and *codeBlockGroupTransmission* within the same cell group.

intraBandNC-PRACH-simulTx

Enables parallel PRACH and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiguous CA (see TS 38.213 [13], clause 8.1 and TS 38.214 [19], clause 6.2.1). This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message.

mcs-C-RNTI

RNTI to indicate use of *qam64LowSE* for grant-based transmissions. When the *mcs-C-RNTI* is configured, RNTI scrambling of DCI CRC is used to choose the corresponding MCS table.

nfi-TotalDAI-Included

Indicates whether the NFI and total DAI fields of the non-scheduled PDSCH group is included in the non-fallback DL grant DCI (see TS 38.212 [17], clause 7.3.1). The network configures this only when enhanced dynamic codebook is configured (pdsch-HARQ-ACK-Codebook is set to enhancedDynamic).

nrdc-PCmode-FR1

Indicates the uplink power sharing mode that the UE uses in NR-DC in frequency range 1 (FR1) (see TS 38.213 [13], clause 7.6).

nrdc-PCmode-FR2

Indicates the uplink power sharing mode that the UE uses in NR-DC in frequency range 2 (FR2) (see TS 38.213 [13], clause 7.6).

pdcch-BlindDetection, pdcch-BlindDetection2, pdcch-BlindDetection3

Indicates the reference number of cells for PDCCH blind detection for the CG. Network configures the field for each CG when the UE is in NR DC and sets the value in accordance with the constraints specified in TS 38.213 [13]. The network configures *pdcch-BlindDetection* only if the UE is in NR-DC. The network configures *pdcch-BlindDetection2* only if the UE is in NR-DC with at least one downlink cell using Rel-16 PDCCH monitoring capability. The network configures *pdcch-BlindDetection3* only if the UE is in NR-DC with at least one downlink cell using Rel-15 PDCCH monitoring capability.

pdcch-BlindDetectionCA-CombIndicator

Configure one combination of *pdcch-BlindDetectionCA1* (for R15) and *pdcch-BlindDetectionCA2* (for R16) for UE to use for scaling PDCCH monitoring capability if the number of serving cells configured to a UE is larger than the reported capability, and if UE reports more than one combination of *pdcch-BlindDetectionCA1* and *pdcch-BlindDetectionCA2* configured by *pdcch-BlindDetectionCA-CombIndicator* is from the more than one combination of *pdcch-BlindDetectionCA1* and *pdcch-BlindDetectionCA2* reported by UE (see TS 38.213 [13], clause 10). *pdcch-BlindDetectionCA-CombIndicator-r17* is used to configure one combination of *pdcch-BlindDetectionCA1* (for R15), *pdcch-BlindDetectionCA2* (for R16) and *pdcch-BlindDetectionCA3* (for R17) for UE to use for scaling PDCCH monitoring capability if the number of serving cells configured to a UE is larger than the reported capability, and if UE reports more than one combination of *pdcch-BlindDetectionCA1*, *pdcch-BlindDetectionCA3* as UE capability. The combination of *pdcch-BlindDetectionCA3* and *pdcch-BlindDetectionCA3* configured by *pdcch-BlindDetectionCA-CombIndicator-r17* is from the more than one combination of *pdcch-BlindDetectionCA1*, *pdcch-BlindDetectionCA2* and *pdcch-BlindDetectionCA3* reported by UE (see TS 38.213 [13], clause 10). *pdcch-BlindDetectionCA-CombIndicator-r16* and *pdcch-BlindDetectionCA-CombIndicator-r17* are not configured simultaneously.

p-NR-FR1

The maximum total transmit power to be used by the UE in this NR cell group across all serving cells in frequency range 1 (FR1). The maximum transmit power that the UE may use may be additionally limited by *p-Max* (configured in *FrequencyInfoUL*) and by *p-UE-FR1* (configured total for all serving cells operating on FR1).

p-NR-FR2

The maximum total transmit power to be used by the UE in this NR cell group across all serving cells in frequency range 2 (FR2). The maximum transmit power that the UE may use may be additionally limited by *p-Max* (configured in *FrequencyInfoUL*) and by *p-UE-FR2* (configured total for all serving cells operating on FR2). This field is only used in NR-DC. A UE does not expect to be configured with this parameter in this release of the specification.

prioLowDG-HighCG

Enable PHY prioritization for the case where low-priority dynamic grant-PUSCH collides with high-priority configured grant-PUSCH on a BWP of a serving cell (see TS 38.213 [13], clause 9), when the UE has generated transport blocks for both DG-PUSCH and CG-PUSCH as described in TS 38.321 [3].

prioHighDG-LowCG

Enable PHY prioritization for the case where high-priority dynamic grant PUSCH collides with low-priority configured grant PUSCH on a BWP of a serving cell (see TS 38.213 [13], clause 9), when the UE has generated transport blocks for both DG-PUSCH and CG-PUSCH as described in TS 38.321 [3].

ps-RNTI

RNTI value for scrambling CRC of DCI format 2-6 used for power saving (see TS 38.213 [13], clause 10.1).

ps-Offset

The start of the search-time of DCI format 2-6 with CRC scrambled by PS-RNTI relative to the start of the *drx-onDurationTimer* of Long DRX (see TS 38.213 [13], clause 10.3). Value in multiples of 0.125ms (milliseconds). 1 corresponds to 0.125 ms, 2 corresponds to 0.25 ms, 3 corresponds to 0.375 ms and so on.

ps-WakeUp

Indicates the UE to wake-up if DCI format 2-6 is not detected outside active time (see TS 38.321 [3], clause 5.7). If the field is absent, the UE does not wake-up if DCI format 2-6 is not detected outside active time.

ps-PositionDCI-2-6

Starting position of UE wakeup and SCell dormancy indication in DCI format 2-6 (see TS 38.213 [13], clause 10.3).

ps-TransmitPeriodicL1-RSRP

Indicates the UE to transmit periodic L1-RSRP report(s) when the *drx-onDurationTimer* does not start (see TS 38.321 [3], clause 5.7). If the field is absent, the UE does not transmit periodic L1-RSRP report(s) when the *drx-onDurationTimer* does not start.

ps-TransmitOtherPeriodicCSI

Indicates the UE to transmit periodic CSI report(s) other than L1-RSRP reports when the *drx-onDurationTimer* does not start (see TS 38.321 [3], clause 5.7). If the field is absent, the UE does not transmit periodic CSI report(s) other than L1-RSRP reports when the *drx-onDurationTimer* does not start.

p-UE-FR1

The maximum total transmit power to be used by the UE across all serving cells in frequency range 1 (FR1) across all cell groups. The maximum transmit power that the UE may use may be additionally limited by *p-Max* (configured in *FrequencyInfoUL*) and by *p-NR-FR1* (configured for the cell group).

p-UE-FR2

The maximum total transmit power to be used by the UE across all serving cells in frequency range 2 (FR2) across all cell groups. The maximum transmit power that the UE may use may be additionally limited by *p-Max* (configured in *FrequencyInfoUL*) and by p-NR-FR2 (configured for the cell group). A UE does not expect to be configured with this parameter in this release of the specification.

pdsch-HARQ-ACK-Codebook

The PDSCH HARQ-ACK codebook is either semi-static or dynamic. This is applicable to both CA and non-CA operation (see TS 38.213 [13], clauses 9.1.2 and 9.1.3). If pdsch-HARQ-ACK-Codebook-r16 is signalled, UE shall ignore the pdsch-HARQ-ACK-Codebook (without suffix). For the HARQ-ACK for sidelink, if pdsch-HARQ-ACK-Codebook (codebook-r16 is signalled, the UE uses pdsch-HARQ-ACK-Codebook (without suffix) and ignores pdsch-HARQ-ACK-Codebook-r16. If the field pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup is present, pdsch-HARQ-ACK-Codebook is applied to primary PUCCH group. Otherwise, this field is applied to the cell group (i.e. for all the cells within the cell group). For the HARQ-ACK for sidelink, if the field pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup is present, pdsch-HARQ-ACK-Codebook is applied to primary and secondary PUCCH group and the UE ignores pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup.

pdsch-HARQ-ACK-CodebookList

A list of configurations for one or two HARQ-ACK codebooks. Each configuration in the list is defined in the same way as *pdsch-HARQ-ACK-Codebook* (see TS 38.212 [17], clause 7.3.1.2.2 and TS 38.213 [13], clauses 7.2.1, 9.1.2, 9.1.3 and 9.2.1). If this field is present, the field *pdsch-HARQ-ACK-Codebook* is ignored. If this field is present, the value of this field is applied for primary PUCCH group and for secondary PUCCH group (if configured). For the HARQ-ACK for sidelink, the UE uses *pdsch-HARQ-ACK-CodebookList* if this field is present.

pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup

The PDSCH HARQ-ACK codebook is either semi-static or dynamic. This is applicable to CA operation (see TS 38.213 [13], clauses 9.1.2 and 9.1.3). It is configured for secondary PUCCH group.

pdsch-HARQ-ACK-EnhType3DCI-Field, pdsch-HARQ-ACK-EnhType3DCI-FieldSecondaryPUCCHgroup

Indicates the enhanced Type 3 codebook through a new DCI field to indicate the enhanced Type 3 HARQ-ACK codebook in the primary PUCCH group if the more than one enhanced Type 3 HARQ-ACK codebook is configured for the primary PUCCH group, or in the secondary PUCCH group if the more than one enhanced Type 3 HARQ-ACK code is configured for the secondary PUCCH group, respectively.

pdsch-HARQ-ACK-EnhType3ToAddModList, pdsch-HARQ-ACK-EnhType3SecondaryToAddModList

Configure the list of enhanced Type 3 HARQ-ACK codebooks for the primary PUCCH group and the secondary PUCCH group, respectively. When configured, DCI format 1_1 can request the UE to report A/N for one of the configured enhanced Type 3 HARQ-ACK codebooks in the corresponding PUCCH group (see TS 38.213 [13], clause 9.1.4). The network can configure pdsch-HARQ-ACK-EnhType3SecondaryToAddModList only if secondary PUCCH group is configured.

pdsch-HARQ-ACK-OneShotFeedback

When configured, the DCI format 1_1 can request the UE to report A/N for all HARQ processes and all CCs configured in the PUCCH group (see TS 38.212 [17], clause 7.3.1).

pdsch-HARQ-ACK-OneShotFeedbackCBG

When configured, the DCI format 1_1 can request the UE to include CBG level A/N for each CC with CBG level transmission configured. When not configured, the UE will report TB level A/N even if CBG level transmission is configured for a CC. The network configures this only when pdsch-HARQ-ACK-OneShotFeedback is configured.

pdsch-HARQ-ACK-OneShotFeedbackNDI

When configured, the DCI format 1_1 can request the UE to include NDI for each A/N reported. The network configures this only when pdsch-HARQ-ACK-OneShotFeedback is configured.

pdsch-HARQ-ACK-Retx, pdsch-HARQ-ACK-RetxSecondaryPUCCHgroup

When configured, the DCI format 1_1 can request the UE to perform a HARQ-ACK re-transmission on a PUCCH resource in the primary PUCCH group and the secondary PUCCH group, respectively (see TS 38.213 [13], clause 9.1.5).

pucch-sSCell, pucch-sSCellSecondaryPUCCHgroup

indictates the alternative PUCCH cells for PUCCH cell switching in the primary and the secondary PUCCH group, respectively. For the primary PUCCH group, it is configured for cells on top of SpCell. For the secondary PUCCH group, it is configured for cell on top of the PUCCH SCell.

pucch-sSCellDyn, pucch-sSCellDynsecondaryPUCCHgroup

When configured, PUCCH cell switching based on dynamic indication in DCI format 1_1 is enabled (see TS 38.213 [13], clause 9.A, clause 9.1.5), respectively for the primary PUCCH group and the secondary PUCCH group.

pucch-sSCellPattern, pucch-sSCellPatternSecondaryPUCCHgroup

When configured, the UE applies the semi-static PUCCH cell switching (see TS 38.213 [13], clause 9.A) using the time domain pattern of applicable PUCCH cells indicated by this field, respectively for the primary PUCCH group and the secondary PUCCH group.

simultaneousPUCCH-PUSCH, simultaneousPUCCH-PUSCH-SecondaryPUCCHgroup

Enables simultaneous PUCCH and PUSCH transmissions with different priorities for the primary PUCCH group and the secondary PUCCH group, respectively.

simultaneousSR-PUSCH-diffPUCCH-Groups

Enables simultaneous SR and PUSCH transmissions in different PUCCH groups (see TS 38.321 [3], clause 5.4.1, clause 5.4.4).

sizeDCI-2-6

Size of DCI format 2-6 (see TS 38.213 [13], clause 10.3).

sp-CSI-RNTI

RNTI for Semi-Persistent CSI reporting on PUSCH (see CSI-ReportConfig) (see TS 38.214 [19], clause 5.2.1.5.2). Network always configures the UE with a value for this field when at least one CSI-ReportConfig with reportConfigType set to semi-PersistentOnPUSCH is configured.

tpc-PUCCH-RNTI

RNTI used for PUCCH TPC commands on DCI (see TS 38.213 [13], clause 10.1).

tpc-PUSCH-RNTI

RNTI used for PUSCH TPC commands on DCI (see TS 38.213 [13], clause 10.1).

tpc-SRS-RNTI

RNTI used for SRS TPC commands on DCI (see TS 38.213 [13], clause 10.1).

twoQCLTypeDforPDCCHRepetition

Indicates whether a UE is expected UE to identify and monitor two QCL-TypeD properties for multiple overlapping CORESETs in the case of PDCCH repetition.

uci-MuxWithDiffPrio, uci-MuxWithDiffPrio-secondaryPUCCHgroup

When configured, enables multiplexing a high-priority (HP) HARQ-ACK UCI and a low-priority (LP) HARQ-ACK UCI into a PUCCH or PUSCH for the primary PUCCH group and the secondary PUCCH group, respectively.

ul-TotalDAI-Included

Indicates whether the total DAI fields of the additional PDSCH group is included in the non-fallback UL grant DCI (see TS 38.212 [17], clause 7.3.1). The network configures this only when enhanced dynamic codebook is configured (pdsch-HARQ-ACK-Codebook is set to enhancedDynamic).

xScale

The UE is allowed to drop NR only if the power scaling applied to NR results in a difference between scaled and unscaled NR UL of more than *xScale* dB (see TS 38.213 [13]). If the value is not configured for dynamic power sharing, the UE assumes default value of 6 dB.

MulticastConfig field descriptions

pdsch-HARQ-ACK-CodebookListMulticast

A list of configurations for one or two HARQ-ACK codebooks for MBS multicast. Each configuration in the list is defined in the same way as *pdsch-HARQ-ACK-Codebook* (see TS 38.212 [17], clause 7.3.1.2.2 and TS 38.213 [13], clauses 7.2.1, 9.1.2, 9.1.3 and 9.2.1). If this field is present, the field *pdsch-HARQ-ACK-Codebook* is ignored. If this field is present, the value of this field is applied for primary PUCCH group and for secondary PUCCH group (if configured).

type1-Codebook-Generation-Mode

Indicates the mode of Type-1 HARQ-ACK codebook generation. Mode 1 is based on the k1 values that are in the intersection of K1 set for unicast and K1 set for multicast. Mode 2 is based on the k1 values that in the union of K1 set for unicast and K1 set for multicast.

PDSCH-HARQ-ACK-EnhType3 field descriptions

pdsch-HARQ-ACK-EnhType3CBG

When configured, the DCI format 1_1 or DCI format 1_2 can request the UE to include CBG level A/N for each CC with CBG level transmission configured of the enhanced Type 3 HARQ-ACK codebook. When not configured, the UE will report TB level A/N even if CBG level transmission is configured for a CC.

pdsch-HARQ-ACK-EnhType3NDI

When configured, the DCI format 1_1 or DCI format 1_2 can request the UE to include NDI for each A/N reported of the enhanced Type 3 HARQ-ACK codebook.

perCC

Configures enhanced Type 3 HARQ-ACK codebook using per CC configuration.

perHARQ

Configures enhanced Type 3 HARQ-ACK codebook using per HARQ process and CC configuration.

Conditional Presence	Explanation
MCG-Only	This field is optionally present, Need R, in the <i>PhysicalCellGroupConfig</i> of the MCG. It is absent otherwise.
SCG-Only	This field is optionally present, Need S, in the <i>PhysicalCellGroupConfig</i> of the SCG in (NG)EN-DC as defined in TS 38.213
	[13]. It is absent otherwise.
twoPUCCHgroup	This field is optionally present, Need R, if secondary PUCCH group is configured. It is absent otherwise, Need R.

PLMN-Identity

The IE *PLMN-Identity* identifies a Public Land Mobile Network. Further information regarding how to set the IE is specified in TS 23.003 [21].

PLMN-Identity information element

```
-- ASN1START
-- TAG-PLMN-IDENTITY-START
PLMN-Identity ::=
                                     SEOUENCE {
                                         MCC
                                                             OPTIONAL,
                                                                                          -- Cond MCC
    mcc
    mnc
                                         MNC
                                    SEQUENCE (SIZE (3)) OF MCC-MNC-Digit
MCC ::=
                                    SEQUENCE (SIZE (2..3)) OF MCC-MNC-Digit
MNC ::=
MCC-MNC-Digit ::=
                                    INTEGER (0..9)
-- TAG-PLMN-IDENTITY-STOP
-- ASN1STOP
```

PLMN-Identity field descriptions

mcc

The first element contains the first MCC digit, the second element the second MCC digit and so on. If the field is absent, it takes the same value as the *mcc* of the immediately preceding IE PLMN-Identity. See TS 23.003 [21].

mnc

The first element contains the first MNC digit, the second element the second MNC digit and so on. See TS 23.003 [21].

Conditional Presence	Explanation
MCC	This field is mandatory present when PLMN-Identity is not used in a list or if it is the first entry of PLMN-Identity in a list. Otherwise it is
	optionally present, Need S.

PLMN-IdentityInfoList

The IE *PLMN-IdentityInfoList* includes a list of PLMN identity information.

PLMN-IdentityInfoList information element

```
-- ASN1START
-- TAG-PLMN-IDENTITYINFOLIST-START
PLMN-IdentityInfoList ::=
                                        SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-IdentityInfo
PLMN-IdentityInfo ::=
    plmn-IdentityList
                                            SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity,
    trackingAreaCode
                                            TrackingAreaCode
                                                                                                         OPTIONAL,
                                                                                                                         -- Need R
                                            RAN-AreaCode
                                                                                                         OPTIONAL,
                                                                                                                         -- Need R
    ranac
    cellIdentity
                                            CellIdentity,
                                            ENUMERATED {reserved, notReserved},
    cellReservedForOperatorUse
    iab-Support-r16
                                        ENUMERATED {true}
                                                                                                         OPTIONAL
                                                                                                                        -- Need S
    ]],
    trackingAreaList-r17
                                        SEQUENCE (SIZE (1..maxTAC-r17)) OF TrackingAreaCode
                                                                                                         OPTIONAL,
                                                                                                                        -- Need R
    gNB-ID-Length-r17
                                        INTEGER (22..32)
                                                                                                         OPTIONAL
                                                                                                                        -- Need R
-- TAG-PLMN-IDENTITYINFOLIST-STOP
-- ASN1STOP
```

PLMN-IdentityInfo field descriptions

cellReservedForOperatorUse

Indicates whether the cell is reserved for operator use (per PLMN), as defined in TS 38.304 [20]. This field is ignored by IAB-MT.

gNB-ID-Length

Indicates the length of the gNB ID out of the 36-bit long *cellIdentity*.

iab-Support

This field combines both the support of IAB and the cell status for IAB. If the field is present, the cell supports IAB and the cell is also considered as a candidate for cell (re)selection for IAB-node; if the field is absent, the cell does not support IAB and/or the cell is barred for IAB-node.

trackingAreaCode

Indicates Tracking Area Code to which the cell indicated by *cellIdentity* field belongs. The absence of the field indicates that the cell only supports PSCell/SCell functionality (per PLMN) or is an NTN cell.

trackingAreaList

List of Tracking Areas to which the cell indicated by *cellIdentity* field belongs. If this field is present, network does not configure *trackingAreaCode*. Total number of different TACs across different *PLMN-IdentityInfos* shall not exceed *maxTAC*. This field is only present in an NTN cell.

PLMN-IdentityList2

Includes a list of PLMN identities.

PLMN-IdentityList2 information element

```
-- ASN1START
-- TAG-PLMNIDENTITYLIST2-START

PLMN-IdentityList2-r16 ::= SEQUENCE (SIZE (1..16)) OF PLMN-Identity
-- TAG-PLMNIDENTITYLIST2-STOP
-- ASN1STOP
```

– PRB-Id

The IE *PRB-Id* identifies a Physical Resource Block (PRB) position within a carrier.

PRB-Id information element

```
-- ASN1START
-- TAG-PRB-ID-START

PRB-Id ::= INTEGER (0..maxNrofPhysicalResourceBlocks-1)

-- TAG-PRB-ID-STOP
-- ASN1STOP
```

PTRS-DownlinkConfig

The IE PTRS-DownlinkConfig is used to configure downlink phase tracking reference signals (PTRS) (see TS 38.214 [19] clause 5.1.6.3)

PTRS-DownlinkConfig information element

```
-- ASN1START
-- TAG-PTRS-DOWNLINKCONFIG-START
PTRS-DownlinkConfig ::=
                                   SEOUENCE {
    frequencyDensity
                                       SEQUENCE (SIZE (2)) OF INTEGER (1..276)
                                                                                                              OPTIONAL. -- Need S
    timeDensity
                                       SEQUENCE (SIZE (3)) OF INTEGER (0..29)
                                                                                                              OPTIONAL. -- Need S
    epre-Ratio
                                       INTEGER (0..3)
                                                                                                              OPTIONAL,
                                                                                                                         -- Need S
    resourceElementOffset
                                       ENUMERATED { offset01, offset10, offset11 }
                                                                                                              OPTIONAL,
                                                                                                                         -- Need S
    11
                                       ENUMERATED {n1, n2}
    maxNrofPorts-r16
                                                                                                              OPTIONAL
                                                                                                                         -- Need R
    11
-- TAG-PTRS-DOWNLINKCONFIG-STOP
-- ASN1STOP
```

PTRS-DownlinkConfig field descriptions

epre-Ratio

EPRE ratio between PTRS and PDSCH. Value 0 corresponds to the codepoint "00" in table 4.1-2. Value 1 corresponds to codepoint "01", and so on. If the field is not provided, the UE applies value 0 (see TS 38.214 [19], clause 4.1).

frequencyDensity

Presence and frequency density of DL PT-RS as a function of Scheduled BW. If the field is absent, the UE uses K_PT-RS = 2 (see TS 38.214 [19], clause 5.1.6.3, table 5.1.6.3-2).

maxNrofPorts

The maximum number of DL PTRS ports specified in TS 38.214 [19] (clause 5.1.6.3). 2 PT-RS ports can only be configured for a DL BWP that is configured, as specified in TS 38.214 [19] clause 5.1, with a mode where a single PDSCH has association between the DM-RS ports and the TCI states as defined in TS 38.214 [19] clause 5.1.6.2.

resourceElementOffset

Indicates the subcarrier offset for DL PTRS. If the field is absent, the UE applies the value offset00 (see TS 38.211 [16], clause 7.4.1.2.2).

timeDensity

Presence and time density of DL PT-RS as a function of MCS. The value 29 is only applicable for MCS Table 5.1.3.1-1 (TS 38.214 [19]). If the field is absent, the UE uses L_PT-RS = 1 (see TS 38.214 [19], clause 5.1.6.3, table 5.1.6.3-1).

PTRS-UplinkConfig

The IE PTRS-UplinkConfig is used to configure uplink Phase-Tracking-Reference-Signals (PTRS).

PTRS-UplinkConfig information element

```
-- ASN1START
-- TAG-PTRS-UPLINKCONFIG-START
PTRS-UplinkConfig ::=
                                        SEOUENCE {
    transformPrecoderDisabled
                                            SEQUENCE {
                                            SEQUENCE (SIZE (2)) OF INTEGER (1..276)
       frequencyDensity
                                                                                                    OPTIONAL,
                                                                                                               -- Need S
       timeDensity
                                            SEOUENCE (SIZE (3)) OF INTEGER (0..29)
                                                                                                    OPTIONAL,
                                                                                                               -- Need S
       maxNrofPorts
                                            ENUMERATED {n1, n2},
                                            ENUMERATED {offset01, offset10, offset11 }
       resourceElementOffset
                                                                                                    OPTIONAL.
                                                                                                               -- Need S
       ptrs-Power
                                            ENUMERATED {p00, p01, p10, p11}
                                                                                                    OPTIONAL,
                                                                                                               -- Need R
    transformPrecoderEnabled
                                            SEOUENCE {
       sampleDensity
                                                SEQUENCE (SIZE (5)) OF INTEGER (1..276),
       timeDensityTransformPrecoding
                                                ENUMERATED {d2}
                                                                                                               -- Need S
                                                                                                    OPTIONAL
                                                                                                    OPTIONAL. -- Need R
-- TAG-PTRS-UPLINKCONFIG-STOP
-- ASN1STOP
```

PTRS-UplinkConfig field descriptions

frequencyDensity

Presence and frequency density of UL PT-RS for CP-OFDM waveform as a function of scheduled BW If the field is absent, the UE uses K_PT-RS = 2 (see TS 38.214 [19], clause 6.1).

maxNrofPorts

The maximum number of UL PTRS ports for CP-OFDM (see TS 38.214 [19], clause 6.2.3.1).

ptrs-Power

UL PTRS power boosting factor per PTRS port (see TS 38.214 [19], clause 6.1, table 6.2.3.1.3).

resourceElementOffset

Indicates the subcarrier offset for UL PTRS for CP-OFDM. If the field is absent, the UE applies the value offset00 (see TS 38.211 [16], clause 6.4.1.2.2).

sampleDensity

Sample density of PT-RS for DFT-s-OFDM, pre-DFT, indicating a set of thresholds T={NRBn, n=0,1,2,3,4}, that indicates dependency between presence of PT-RS and scheduled BW and the values of X and K the UE should use depending on the scheduled BW, see TS 38.214 [19], clause 6.1, table 6.2.3.2-1.

timeDensity

Presence and time density of UL PT-RS for CP-OFDM waveform as a function of MCS If the field is absent, the UE uses L PT-RS = 1 (see TS 38.214 [19], clause 6.1).

timeDensityTransformPrecoding

Time density (OFDM symbol level) of PT-RS for DFT-s-OFDM. If the field is absent, the UE applies value d1 (see TS 38.214 [19], clause 6.1).

transformPrecoderDisabled

Configuration of UL PTRS without transform precoder (with CP-OFDM).

transformPrecoderEnabled

Configuration of UL PTRS with transform precoder (DFT-S-OFDM).

PUCCH-Config

The IE *PUCCH-Config* is used to configure UE specific PUCCH parameters (per BWP).

PUCCH-Config information element

```
-- ASN1START
-- TAG-PUCCH-CONFIG-START
PUCCH-Config ::=
                                        SEOUENCE {
    resourceSetToAddModList.
                                            SEQUENCE (SIZE (1..maxNrofPUCCH-ResourceSets)) OF PUCCH-ResourceSet
                                                                                                                   OPTIONAL, -- Need N
    resourceSetToReleaseList
                                            SEQUENCE (SIZE (1..maxNrofPUCCH-ResourceSets)) OF PUCCH-ResourceSetId OPTIONAL, -- Need N
    resourceToAddModList
                                            SEOUENCE (SIZE (1..maxNrofPUCCH-Resources)) OF PUCCH-Resource
                                                                                                                   OPTIONAL, -- Need N
                                            SEQUENCE (SIZE (1..maxNrofPUCCH-Resources)) OF PUCCH-ResourceId
                                                                                                                   OPTIONAL, -- Need N
    resourceToReleaseList
    format1
                                            SetupRelease { PUCCH-FormatConfig
                                                                                                                   OPTIONAL, -- Need M
                                                                                                                   OPTIONAL, -- Need M
    format 2
                                            SetupRelease { PUCCH-FormatConfig
    format3
                                            SetupRelease { PUCCH-FormatConfig
                                                                                                                   OPTIONAL, -- Need M
    format4
                                            SetupRelease { PUCCH-FormatConfig
                                                                                                                   OPTIONAL, -- Need M
    schedulingRequestResourceToAddModList
                                            SEQUENCE (SIZE (1..maxNrofSR-Resources)) OF SchedulingRequestResourceConfig
                                                                                                                   OPTIONAL, -- Need N
                                            SEOUENCE (SIZE (1..maxNrofSR-Resources)) OF SchedulingRequestResourceId
    schedulingRequestResourceToReleaseList
                                                                                                                   OPTIONAL, -- Need N
    multi-CSI-PUCCH-ResourceList
                                            SEQUENCE (SIZE (1..2)) OF PUCCH-ResourceId
                                                                                                                   OPTIONAL, -- Need M
    dl-DataToUL-ACK
                                            SEQUENCE (SIZE (1..8)) OF INTEGER (0..15)
                                                                                                                   OPTIONAL, -- Need M
                                            SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos)) OF PUCCH-SpatialRelationInfo
    spatialRelationInfoToAddModList
                                                                                                                   OPTIONAL, -- Need N
    spatialRelationInfoToReleaseList
                                            SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos)) OF PUCCH-SpatialRelationInfoId
                                                                                                                   OPTIONAL, -- Need N
    pucch-PowerControl
                                            PUCCH-PowerControl
                                                                                                                   OPTIONAL, -- Need M
    . . . ,
    resourceToAddModListExt-v1610
                                            SEQUENCE (SIZE (1..maxNrofPUCCH-Resources)) OF PUCCH-ResourceExt-v1610 OPTIONAL, -- Need N
                                            SetupRelease { DL-DataToUL-ACK-r16 }
    dl-DataToUL-ACK-r16
                                                                                                                   OPTIONAL, -- Need M
                                            SetupRelease { UL-AccessConfigListDCI-1-1-r16 }
                                                                                                                   OPTIONAL, -- Need M
    ul-AccessConfigListDCI-1-1-r16
    subslotLengthForPUCCH-r16
                                            CHOICE {
            normalCP-r16
                                                ENUMERATED {n2,n7},
            extendedCP-r16
                                                ENUMERATED {n2,n6}
                                                                                                                   OPTIONAL, -- Need R
    dl-DataToUL-ACK-DCI-1-2-r16
                                            SetupRelease { DL-DataToUL-ACK-DCI-1-2-r16}
                                                                                                                   OPTIONAL, -- Need M
    numberOfBitsForPUCCH-ResourceIndicatorDCI-1-2-r16 INTEGER (0..3)
                                                                                                                   OPTIONAL, -- Need R
    dmrs-UplinkTransformPrecodingPUCCH-r16 ENUMERATED {enabled}
                                                                                                                   OPTIONAL, -- Cond PI2-BPSK
    spatialRelationInfoToAddModListSizeExt-v1610
                                                   SEQUENCE (SIZE (1..maxNrofSpatialRelationInfosDiff-r16)) OF PUCCH-SpatialRelationInfo
                                                                                                                   OPTIONAL, -- Need N
    spatialRelationInfoToReleaseListSizeExt-v1610
                                                   SEQUENCE (SIZE (1..maxNrofSpatialRelationInfosDiff-r16)) OF PUCCH-SpatialRelationInfoId
                                                                                                                   OPTIONAL, -- Need N
    spatialRelationInfoToAddModListExt-v1610 SEQUENCE (SIZE (1...maxNrofSpatialRelationInfos-r16)) OF PUCCH-SpatialRelationInfoExt-r16
                                                                                                                   OPTIONAL, -- Need N
    spatialRelationInfoToReleaseListExt-v1610
                                                 SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos-r16)) OF
                                                                            PUCCH-SpatialRelationInfoId-r16
                                                                                                                   OPTIONAL, -- Need N
    resourceGroupToAddModList-r16
                                            SEQUENCE (SIZE (1..maxNrofPUCCH-ResourceGroups-r16)) OF PUCCH-ResourceGroup-r16
                                                                                                                   OPTIONAL, -- Need N
    resourceGroupToReleaseList-r16
                                            SEQUENCE (SIZE (1..maxNrofPUCCH-ResourceGroups-r16)) OF PUCCH-ResourceGroupId-r16
                                                                                                                   OPTIONAL, -- Need N
```

```
SetupRelease { SPS-PUCCH-AN-List-r16 }
    sps-PUCCH-AN-List-r16
                                                                                                               OPTIONAL, -- Need M
    schedulingRequestResourceToAddModListExt-v1610 SEOUENCE (SIZE (1..maxNrofSR-Resources)) OF SchedulingRequestResourceConfigExt-v1610
                                                                                                               OPTIONAL -- Need N
    ]],
    ГΓ
    format.0-r17
                                           SetupRelease { PUCCH-FormatConfig }
                                                                                                               OPTIONAL, -- Need M
    format2Ext-r17
                                          SetupRelease
                                                         PUCCH-FormatConfigExt-r17
                                                                                                               OPTIONAL, -- Need M
    format3Ext-r17
                                          SetupRelease
                                                        { PUCCH-FormatConfigExt-r17
                                                                                                               OPTIONAL, -- Need M
    format4Ext-r17
                                          SetupRelease { PUCCH-FormatConfigExt-r17 }
                                                                                                               OPTIONAL, -- Need M
                                          SetupRelease { UL-AccessConfigListDCI-1-2-r17 }
                                                                                                               OPTIONAL, -- Need M
    ul-AccessConfigListDCI-1-2-r17
                                          ENUMERATED {cyclicMapping, sequentialMapping}
                                                                                                               OPTIONAL, -- Need R
   mappingPattern-r17
    powerControlSetInfoToAddModList-r17
                                          SEQUENCE (SIZE (1..maxNrofPowerControlSetInfos-r17)) OF PUCCH-PowerControlSetInfo-r17
                                                                                                               OPTIONAL, -- Need N
    powerControlSetInfoToReleaseList-r17
                                          SEQUENCE (SIZE (1..maxNrofPowerControlSetInfos-r17)) OF PUCCH-PowerControlSetInfoId-r17
                                                                                                               OPTIONAL, -- Need N
    secondTPCFieldDCI-1-1-r17
                                          ENUMERATED {enabled}
                                                                                                               OPTIONAL, -- Need R
                                          ENUMERATED {enabled}
                                                                                                               OPTIONAL, -- Need R
    secondTPCFieldDCI-1-2-r17
    dl-DataToUL-ACK-r17
                                          SetupRelease { DL-DataToUL-ACK-r17
                                                                                                               OPTIONAL, -- Need M
    dl-DataToUL-ACK-DCI-1-2-r17
                                          SetupRelease { DL-DataToUL-ACK-DCI-1-2-r17}
                                                                                                               OPTIONAL, -- Need M
    ul-AccessConfigListDCI-1-1-r17
                                          SetupRelease { UL-AccessConfigListDCI-1-1-r17 }
                                                                                                               OPTIONAL, -- Need M
    schedulingRequestResourceToAddModListExt-v1700 SEQUENCE (SIZE (1..maxNrofSR-Resources)) OF SchedulingRequestResourceConfigExt-v1700
                                                                                                               OPTIONAL, -- Need N
    dmrs-BundlingPUCCH-Config-r17
                                           SetupRelease { DMRS-BundlingPUCCH-Config-r17 }
                                                                                                               OPTIONAL, -- Need M
    dl-DataToUL-ACK-v1700
                                          SetupRelease { DL-DataToUL-ACK-v1700 }
                                                                                                               OPTIONAL, -- Need M
   OPTIONAL, -- Need M
    sps-PUCCH-AN-ListMulticast-r17
                                          SetupRelease { SPS-PUCCH-AN-List-r16 }
                                                                                                               OPTIONAL -- Need M
    ]]
PUCCH-FormatConfig ::=
                                       SEOUENCE {
   interslotFrequencyHopping
                                           ENUMERATED {enabled}
                                                                                                               OPTIONAL, -- Need R
   additionalDMRS
                                          ENUMERATED {true}
                                                                                                               OPTIONAL, -- Need R
   maxCodeRate
                                          PUCCH-MaxCodeRate
                                                                                                               OPTIONAL, -- Need R
                                                                                                               OPTIONAL, -- Need S
   nrofSlots
                                          ENUMERATED {n2,n4,n8}
   pi2BPSK
                                          ENUMERATED {enabled}
                                                                                                               OPTIONAL, -- Need R
    simultaneousHARO-ACK-CSI
                                          ENUMERATED {true}
                                                                                                               OPTIONAL -- Need R
PUCCH-FormatConfigExt-r17 ::=
                                       SEOUENCE {
   maxCodeRateLP-r17
                                           PUCCH-MaxCodeRate
                                                                                                               OPTIONAL, -- Need R
    . . .
                                       ENUMERATED {zeroDot18, zeroDot15, zeroDot25, zeroDot35, zeroDot45, zeroDot60, zeroDot80}
PUCCH-MaxCodeRate ::=
-- A set with one or more PUCCH resources
PUCCH-ResourceSet ::=
                                       SEOUENCE {
   pucch-ResourceSetId
                                          PUCCH-ResourceSetId,
   resourceList
                                          SEOUENCE (SIZE (1..maxNrofPUCCH-ResourcesPerSet)) OF PUCCH-ResourceId.
    maxPayloadSize
                                          INTEGER (4..256)
                                                                                                               OPTIONAL -- Need R
PUCCH-ResourceSetId ::=
                                      INTEGER (0..maxNrofPUCCH-ResourceSets-1)
```

```
PUCCH-Resource ::=
                                         SEOUENCE {
    pucch-ResourceId
                                             PUCCH-ResourceId,
    startingPRB
                                             PRB-Id.
    intraSlotFrequencyHopping
                                             ENUMERATED { enabled }
    secondHopPRB
                                             PRB-Id
    format
                                             CHOICE {
        format.0
                                                 PUCCH-format0,
        format1
                                                 PUCCH-format1,
        format 2
                                                 PUCCH-format2,
        format3
                                                 PUCCH-format3,
        format4
                                                 PUCCH-format4
PUCCH-ResourceExt-v1610 ::=
                                         SEOUENCE {
    interlaceAllocation-r16
                                             SEOUENCE {
        rb-SetIndex-r16
                                                 INTEGER (0..4),
        interlace0-r16
                                                 CHOICE {
            scs15
                                                     INTEGER (0..9),
                                                     INTEGER (0..4)
            scs30
    format-v1610
                                             CHOICE {
       interlace1-v1610
                                                     INTEGER (0..9),
        occ-v1610
                                                     SEQUENCE {
            occ-Length-v1610
                                                             ENUMERATED {n2,n4}
            occ-Index-v1610
                                                             ENUMERATED {n0,n1,n2,n3}
    . . . ,
    formatExt-v1700
                                             SEQUENCE {
       nrofPRBs-r17
                                                 INTEGER (1..16)
    pucch-RepetitionNrofSlots-r17
                                             ENUMERATED { n1, n2, n4, n8 }
    11
PUCCH-ResourceId ::=
                                         INTEGER (0..maxNrofPUCCH-Resources-1)
PUCCH-format0 ::=
                                                 SEQUENCE {
    initialCyclicShift
                                                     INTEGER(0..11),
    nrofSymbols
                                                     INTEGER (1..2),
    startingSymbolIndex
                                                     INTEGER(0..13)
PUCCH-format1 ::=
                                                 SEQUENCE {
    initialCyclicShift
                                                     INTEGER(0..11),
    nrofSymbols
                                                     INTEGER (4..14),
    startingSymbolIndex
                                                     INTEGER(0..10),
    timeDomainOCC
                                                     INTEGER (0..6)
```

```
OPTIONAL, -- Need R

OPTIONAL, -- Need M

OPTIONAL -- Need M

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL -- Need R
```

OPTIONAL, -- Need R

```
PUCCH-format2 ::=
                                                SEOUENCE {
    nrofPRBs
                                                    INTEGER (1..16),
    nrofSymbols
                                                    INTEGER (1..2),
    startingSymbolIndex
                                                    INTEGER(0..13)
PUCCH-format3 ::=
                                                SEOUENCE {
    nrofPRBs
                                                    INTEGER (1..16),
    nrofSymbols
                                                    INTEGER (4..14),
    startingSymbolIndex
                                                    INTEGER(0..10)
PUCCH-format4 ::=
                                                SEQUENCE {
    nrofSymbols
                                                    INTEGER (4..14),
    occ-Length
                                                    ENUMERATED {n2,n4},
    occ-Index
                                                    ENUMERATED {n0,n1,n2,n3},
    startingSymbolIndex
                                                    INTEGER(0..10)
PUCCH-ResourceGroup-r16 ::=
                                           SEQUENCE {
    pucch-ResourceGroupId-r16
                                               PUCCH-ResourceGroupId-r16,
    resourcePerGroupList-r16
                                               SEQUENCE (SIZE (1..maxNrofPUCCH-ResourcesPerGroup-r16)) OF PUCCH-ResourceId
PUCCH-ResourceGroupId-r16 ::=
                                           INTEGER (0..maxNrofPUCCH-ResourceGroups-1-r16)
DL-DataToUL-ACK-r16 ::=
                                           SEQUENCE (SIZE (1..8)) OF INTEGER (-1..15)
DL-DataToUL-ACK-r17 ::=
                                           SEQUENCE (SIZE (1..8)) OF INTEGER (-1..127)
DL-DataToUL-ACK-v1700 ::=
                                           SEQUENCE (SIZE (1..8)) OF INTEGER (16..31)
DL-DataToUL-ACK-DCI-1-2-r16 ::=
                                           SEQUENCE (SIZE (1..8)) OF INTEGER (0..15)
DL-DataToUL-ACK-DCI-1-2-r17 ::=
                                           SEQUENCE (SIZE (1..8)) OF INTEGER (0..127)
UL-AccessConfigListDCI-1-1-r16 ::=
                                           SEQUENCE (SIZE (1..16)) OF INTEGER (0..15)
UL-AccessConfigListDCI-1-2-r17 ::=
                                           SEQUENCE (SIZE (1..16)) OF INTEGER (0..15)
UL-AccessConfigListDCI-1-1-r17 ::=
                                           SEQUENCE (SIZE (1..3)) OF INTEGER (0..2)
DL-DataToUL-ACK-MulticastDCI-Format4-1-r17 ::= SEQUENCE (SIZE (1..8)) OF INTEGER (0..15)
-- TAG-PUCCH-CONFIG-STOP
-- ASN1STOP
```

PUCCH-Config field descriptions

dl-DataToUL-ACK, dl-DataToUL-ACK-DCI-1-2

List of timing for given PDSCH to the DL ACK (see TS 38.213 [13], clause 9.1.2). The field *dl-DataToUL-ACK* applies to DCI format 1_1 and the field *dl-DataToUL-ACK-DCI-12* applies to DCI format 1_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.2.3). The *dl-DataToUL-ACK-v1700* is applicable for NTN and *dl-DataToUL-ACK-r17* is applicable for up to 71 GHz. If *dl-DataToUL-ACK-r16* or *dl-DataToUL-ACK-r17* or *dl-DataToUL-ACK-v1700* is signalled, UE shall ignore the *dl-DataToUL-ACK* (without suffix). The value -1 corresponds to "inapplicable value" for the case where the A/N feedback timing is not explicitly included at the time of scheduling PDSCH. The fields *dl-DataToUL-ACK-r17* and *dl-DataToUL-ACK-DCI-1-2-r17* are only applicable for SCS of 480 kHz or 960 kHz.

dl-DataToUL-ACK-MulticastDCl-Format4-1

List of timing for given group-common PDSCH to the DL ACK (see TS 38.213 [13], clause 9.1.2). The field *dl-DataToUL-ACK-MulticastDciFormat4-1* applies to DCI format 4_1 for MBS multicast (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.2.3).

dmrs-BundlingPUCCH-Config

Configuration of the parameters for DMRS bundling for PUCCH (see TS 38.214 [19], clause 6.1.7). DMRS bundling for PUCCH is not supported for PUCCH format 0/2. In this release, this is not applicable to FR2-2.

dmrs-UplinkTransformPrecodingPUCCH

This field is used for PUCCH formats 3 and 4 according to TS 38.211, Clause 6.4.1.3.3.1.

format0

Parameters that are common for all PUCCH resources of format 0.

format1

Parameters that are common for all PUCCH resources of format 1.

format2

Parameters that are common for all PUCCH resources of format 2.

format3

Parameters that are common for all PUCCH resources of format 3.

format4

Parameters that are common for all PUCCH resources of format 4.

mappingPattern

Indicates whether the UE should follow Cyclical mapping pattern or Sequential mapping pattern for when a PUCCH resource used for repetitions of a PUCCH transmission includes first and second spatial settings for FR2, or first and second sets of power control parameters for FR1 (see TS 38.213 [13], clause 9.2.6).

numberOfBitsForPUCCH-ResourceIndicatorDCI-1-2

Configuration of the number of bits for "PUCCH resource indicator" in DCI format 1_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.2.3).

powerControlSetInfoToAddModList

Configures power control sets for repetition of a PUCCH transmission in FR1. This field is not configured if *ul-powerControl* is configured in the *BWP-UplinkDedicated* in which the *PUCCH-Config* is included.

pucch-PowerControl

Configures power control parameters PUCCH transmission. This field is not configured if unifiedTCI-StateType is configured for the serving cell.

resourceGroupToAddModList, resourceGroupToReleaseList

Lists for adding and releasing groups of PUCCH resources that can be updated simultaneously for spatial relations with a MAC CE.

resourceSetToAddModList, resourceSetToReleaseList

Lists for adding and releasing PUCCH resource sets (see TS 38.213 [13], clause 9.2).

resourceToAddModList, resourceToAddModListExt, resourceToReleaseList

Lists for adding and releasing PUCCH resources applicable for the UL BWP and serving cell in which the *PUCCH-Config* is defined. The resources defined herein are referred to from other parts of the configuration to determine which resource the UE shall use for which report. If the network includes of *resourceToAddModListExt*, it includes the same number of entries, and listed in the same order, as in *resourceToAddModList*.

secondTPCFieldDCI-1-1, secondTPCFieldDCI-1-2

A second TPC field can be configured via RRC for DCI-1-1 and DCI-1-2. Each TPC field is for each closed-loop index value respectively (i.e., 1st /2nd TPC fields correspond to "closedLoopIndex" value = 0 and 1.

spatialRelationInfoToAddModList, spatialRelationInfoToAddModListSizeExt, spatialRelationInfoToAddModListExt

Configuration of the spatial relation between a reference RS and PUCCH. Reference RS can be SSB/CSI-RS/SRS. If the list has more than one element, MAC-CE selects a single element (see TS 38.321 [3], clause 5.18.8 and TS 38.213 [13], clause 9.2.2). The UE shall consider entries in *spatialRelationInfoToAddModList* and in *spatialRelationInfoToAddModListSizeExt* as a single list, i.e. an entry created using *spatialRelationInfoToAddModList* can be modified using *spatialRelationInfoToAddModListSizeExt* (or deleted using *spatialRelationInfoToReleaseListSizeExt*) and vice-versa. If the network includes *spatialRelationInfoToAddModListExt*, it includes the same number of entries, and listed in the same order, as in the concatenation of *spatialRelationInfoToAddModListSizeExt*. If *unifiedTCI-StateType* is configured for the serving cell, no element in this list is configured.

spatialRelationInfoToReleaseList, spatialRelationInfoToReleaseListSizeExt, spatialRelationInfoToReleaseListExt

Lists of spatial relation configurations between a reference RS and PUCCH to be released by the UE.

sps-PUCCH-AN-List

Indicates a list of PUCCH resources for DL SPS HARQ ACK. The field *maxPayloadSize* is absent for the first and the last *SPS-PUCCH-AN* in the list. If configured, this overrides *n1PUCCH-AN* in *SPS-config*.

sps-PUCCH-AN-ListMulticast

The field is used to configure the list of PUCCH resources per HARQ ACK codebook for MBS multicast.

subslotLengthForPUCCH

Indicates the sub-slot length for sub-slot based PUCCH feedback in number of symbols (see TS 38.213 [13], clause 9). Value *n*2 corresponds to 2 symbols, value *n*6 corresponds to 6 symbols, value *n*7 corresponds to 7 symbols. For normal CP, the value is either *n*2 or *n*7. For extended CP, the value is either *n*2 or *n*6.

ul-AccessConfigListDCI-1-1, ul-AccessConfigListDCI-1-2

List of the combinations of cyclic prefix extension and UL channel access type (see TS 38.212 [17], clause 7.3.1) applicable, respectively, to DCI format 1_1 and DCI format 1_2. The fields *ul-AccessConfigListDCI-1-1-r16* and *ul-AccessConfigListDCI-1-2-r17* are only applicable for FR1 (see TS 38.212 [17], Table 7.3.1.2.2-6). The field *ul-AccessConfigListDCI-1-1-r17* indicates a list which only contains UL channel access types and is only applicable for FR2-2 (see TS 38.212 [17], Table 7.3.1.2.2-6A).

PUCCH-format3 field descriptions

nrofPRBs

The supported values are 1,2,3,4,5,6,8,9,10,12,15 and 16. The UE shall ignore this field when formatExt is configured.

PUCCH-FormatConfig, PUCCH-FormatConfigExt field descriptions

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additionalDMRS

If the field is present, the UE enables 2 DMRS symbols per hop of a PUCCH Format 3 or 4 if both hops are more than X symbols when FH is enabled (X=4). And it enables 4 DMRS symbols for a PUCCH Format 3 or 4 with more than 2X+1 symbols when FH is disabled (X=4). The field is not applicable for format 0, 1 and 2. See TS 38.213 [13], clause 9.2.2.

interslotFrequencyHopping

If the field is present, the UE enables inter-slot frequency hopping when PUCCH Format 0, 1, 3 or 4 is repeated over multiple slots. For long PUCCH over multiple slots, the intra and inter slot frequency hopping cannot be enabled at the same time for a UE. The field is not applicable for format 2. See TS 38.213 [13], clause 9.2.6.

maxCodeRate

Max coding rate to determine how to feedback UCI on PUCCH for format 2, 3 or 4. The field is not applicable for format 0 and 1. See TS 38.213 [13], clause 9.2.5.

maxCodeRateLP

Max coding rate to determine how to feedback UCI on PUCCH for format 2, 3 or 4. The field is not applicable for format 0 and 1. This field configures additional max code rate in the second entry of *PUCCH-ConfigurationList-r16* for multiplexing low-priority (LP) HARQ-ACK and high-priority (HP) UCI in a PUCCH as described Clause 9.2.5.3 of TS 38.213 [13]. The field is absent for the first entry of *PUCCH-ConfigurationList-r16*.

nrofSlots

Number of slots with the same PUCCH. When the field is absent the UE applies the value n1. The field is not applicable for format 2. See TS 38.213 [13], clause 9.2.6.

pi2BPSK

If the field is present, the UE uses pi/2 BPSK for UCI symbols instead of QPSK for PUCCH. The field is not applicable for format 0, 1 and 2. See TS 38.213 [13], clause 9.2.5.

rb-SetIndex

Indicates the RB set where PUCCH resource is allocated.

simultaneousHARQ-ACK-CSI

If the field is present, the UE uses simultaneous transmission of CSI and HARQ-ACK feedback with or without SR with PUCCH Format 2, 3 or 4. See TS 38.213 [13], clause 9.2.5. When the field is absent the UE applies the value off. The field is not applicable for format 0 and 1.

PUCCH-Resource, PUCCH-ResourceExt field descriptions

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format, formatExt

Selection of the PUCCH format (format 0 – 4) and format-specific parameters, see TS 38.213 [13], clause 9.2. *format0* and *format1* are only allowed for a resource in a first PUCCH resource set. *format2*, *format3* and *format4* are only allowed for a resource in non-first PUCCH resource set. The network can only configure *formatExt-v1610* when format is set to *format2* or *format3*. The network only configures *formatExt-v17xx* when format is set to *format0*, *format1* or *format4*.

interlace0

This is the only interlace of interlaced PUCCH Format 0 and 1 and the first interlace for interlaced PUCCH Format 2 and 3.

interlace1

A second interlace, in addition to interlace 0, as specified in TS 38.213 [13], clause 9.2.1. For 15kHz SCS, values {0..9} are applicable; for 30kHz SCS, values {0..4} are applicable. For 15kHz SCS, the values of *interlace1* shall satisfy *interlace1*=mod(*interlace0*+X,10) where X=1, -1, or 5.

intraSlotFrequencyHopping

Enabling intra-slot frequency hopping, applicable for all types of PUCCH formats. For long PUCCH over multiple slots, the intra and inter slot frequency hopping cannot be enabled at the same time for a UE. See TS 38.213 [13], clause 9.2.1.

nrofPRBs

Indicates the number of PRBs used per PUCCH resource for the PUCCH format, see TS 38.213 [13], clause 9.2.1. This field is applicable for PUCCH format0, format1, and format4 in FR2-2. The supported values for format4 are 1,2,3,4,5,6,8,9,10,12,15 and 16.

occ-Index

Indicates the orthogonal cover code index (see TS 38.213 [13], clause 9.2.1). This field is applicable when useInterlacePUCCH-PUSCH-16 is configured.

occ-Length

Indicates the orthogonal cover code length (see TS 38.213 [13], clause 9.2.1). This field is applicable when useInterlacePUCCH-PUSCH-16 is configured.

pucch-RepetitionNrofSlots

Configuration of PUCCH repetition factor per PUCCH resource with associated scheduling DCI corresponding to Rel-17 dynamic PUCCH repetition. For a PUCCH resource, if both the field *pucch-RepetitionNrofSlots* and the field *nrofSlots* are present, the field *nrofSlots* is ignored and apply the value of *pucch-RepetitionNrofSlots* corresponding to Rel-17 dynamic PUCCH repetition. If this field is absent in a PUCCH resource with associated scheduling DCI, the UE applies the value of field *nrofSlots*.

pucch-Resourceld

Identifier of the PUCCH resource.

secondHopPRB

Index of first PRB after frequency hopping of PUCCH. This value is applicable for intra-slot frequency hopping (see TS 38.213 [13], clause 9.2.1) or inter-slot frequency hopping (see TS 38.213 [13], clause 9.2.6).

PUCCH-ResourceSet field descriptions

maxPayloadSize

Maximum number of UCI information bits that the UE may transmit using this PUCCH resource set (see TS 38.213 [13], clause 9.2.1). In a PUCCH occurrence, the UE chooses the first of its *PUCCH-ResourceSet* which supports the number of bits that the UE wants to transmit. The field is absent in the first set (Set0) and in the last configured set since the UE derives the maximum number of UCI information bits as specified in TS 38.213 [13], clause 9.2.1. This field can take integer values that are multiples of 4.

resourceList

PUCCH resources of *format0* and *format1* are only allowed in the first PUCCH resource set, i.e., in a PUCCH-ResourceSet with *pucch-ResourceSetId* = 0. This set may contain between 1 and 32 resources. PUCCH resources of *format2*, *format3* and *format4* are only allowed in a *PUCCH-ResourceSet* with *pucch-ResourceSetId* > 0. If present, these sets contain between 1 and 8 resources each. The UE chooses a *PUCCH-Resource* from this list as specified in TS 38.213 [13], clause 9.2.3. Note that this list contains only a list of resource IDs. The actual resources are configured in *PUCCH-Config*.

Conditional Presence	Explanation
PI2-BPSK	The field is optionally present, Need R, if <i>format3</i> and/or <i>format4</i> are configured and <i>pi2BPSK</i> is configured in each of them. It is absent, Need R otherwise.

PUCCH-ConfigCommon

-- ASN1STOP

The IE *PUCCH-ConfigCommon* is used to configure the cell specific PUCCH parameters.

PUCCH-ConfigCommon information element

```
-- ASN1START
-- TAG-PUCCH-CONFIGCOMMON-START
PUCCH-ConfigCommon ::=
                                   SEQUENCE {
    pucch-ResourceCommon
                                       INTEGER (0..15)
                                                                                           OPTIONAL,
                                                                                                       -- Cond InitialBWP-Only
    pucch-GroupHopping
                                       ENUMERATED { neither, enable, disable },
   hoppingId
                                       INTEGER (0..1023)
                                                                                           OPTIONAL,
                                                                                                       -- Need R
                                                                                           OPTIONAL, -- Need R
    p0-nominal
                                       INTEGER (-202..24)
    . . . ,
    ] ]
    nrofPRBs
                                       INTEGER (1..16)
                                                                                           OPTIONAL, -- Need R
                                       ENUMERATED {fromLowerEdge, fromUpperEdge}
                                                                                           OPTIONAL, -- Need R
    intra-SlotFH-r17
    pucch-ResourceCommonRedCap-r17
                                      INTEGER (0..15)
                                                                                          OPTIONAL, -- Cond InitialBWP-RedCap
    additionalPRBOffset-r17
                                           ENUMERATED {n2, n3, n4, n6, n8, n9, n10, n12}
                                                                                          OPTIONAL -- Need S
-- TAG-PUCCH-CONFIGCOMMON-STOP
```

PUCCH-ConfigCommon field descriptions

additionalPRBOffset

When intra-slot PUCCH frequency hopping within RedCap-specific initial UL BWP is disabled, each common PUCCH resource is mapped to a single PRB on one side of the UL BWP. This parameter determines an additional PRB offset in the PRB mapping for the PUCCH resource. If the field is not configured, the UE shall assume an additional PRB offset of zero.

hoppingld

Cell-specific scrambling ID for group hopping and sequence hopping if enabled, see TS 38.211 [16], clause 6.3.2.2.

intra-SlotFH-r17

In case a separate initial UL BWP is configured for RedCap UEs, the presence of this parameter indicates whether intra-slot PUCCH frequency hopping within the separate initial UL BWP in the common PUCCH resource is enabled for RedCap UEs. If this field is absent, intra-slot PUCCH frequency hopping within RedCap-specific initial UL BWP is enabled. If this field is present, intra-slot PUCCH frequency hopping within RedCap-specific initial UL BWP is disabled and each PUCCH resource is mapped to a single PRB on one side of the UL BWP and this parameter determines whether the PRB index in the PRB mapping is counted in increasing order from the lower edge or in decreasing order from the upper edge of the UL BWP.

nrofPRBs

Indicates the number of PRBs used per PUCCH resource for PUCCH format 0 and format 1 in FR2-2, see TS 38.213 [13], clause 9.2.1.

p0-nominal

Power control parameter P0 for PUCCH transmissions. Value in dBm. Only even values (step size 2) allowed (see TS 38.213 [13], clause 7.2).

pucch-GroupHopping

Configuration of group- and sequence hopping for all the PUCCH formats 0, 1, 3 and 4. Value *neither* implies neither group or sequence hopping is enabled. Value *enable* enables group hopping and disables sequence hopping. Value *disable* disables group hopping and enables sequence hopping (see TS 38.211 [16], clause 6.3.2.2).

pucch-ResourceCommon

An entry into a 16-row table where each row configures a set of cell-specific PUCCH resources/parameters. The UE uses those PUCCH resources until it is provided with a dedicated *PUCCH-Config* (e.g. during initial access) on the initial uplink BWP. Once the network provides a dedicated *PUCCH-Config* for that bandwidth part the UE applies that one instead of the one provided in this field (see TS 38.213 [13], clause 9.2).

pucch-ResourceCommonRedCap

An entry into a 16-row table where each row configures a set of cell-specific PUCCH resources/parameters for RedCap UEs. The UE uses those PUCCH resources until it is provided with a dedicated *PUCCH-Config* (e.g. during initial access) on the initial uplink BWP. Once the network provides a dedicated *PUCCH-Config* for that bandwidth part the UE applies that one instead of the one provided in this field (see TS 38.213 [13], clause 9.2).

Conditional Presence	Explanation
InitialBWP-Only	The field is mandatory present in the PUCCH-ConfigCommon of the initial BWP (BWP#0) in SIB1. It is absent in other BWPs
	including the RedCap-specific initial uplink BWP, if configured.
InitialBWP-RedCap	The field is mandatory present in the <i>PUCCH-ConfigCommon</i> of the RedCap-specific initial BWP. It is optional present, Need R, in the <i>PUCCH-ConfigCommon</i> of the initial BWP configured by <i>initialUplinkBWP</i> . It is absent in other BWPs.

PUCCH-ConfigurationList

The IE *PUCCH-ConfigurationList* is used to configure UE specific PUCCH parameters (per BWP) for two simultaneously constructed HARQ-ACK codebooks. See TS 38.213 [13], clause 9.1.

PUCCH-ConfigurationList information element

- -- ASN1START
- -- TAG-PUCCH-CONFIGURATIONLIST-START

```
PUCCH-ConfigurationList-r16 ::= SEQUENCE (SIZE (1..2)) OF PUCCH-Config
-- TAG-PUCCH-CONFIGURATIONLIST-STOP
-- ASN1STOP
```

PUCCH-PathlossReferenceRS-Id

The IE *PUCCH-PathlossReferenceRS-Id* is an ID for a reference signal (RS) configured as PUCCH pathloss reference (see TS 38.213 [13], clause 7.2).

PUCCH-PathlossReferenceRS-Id information element

```
-- ASN1START
-- TAG-PUCCH-PATHLOSSREFERENCERS-ID-START

PUCCH-PathlossReferenceRS-Id ::= INTEGER (0..maxNrofPUCCH-PathlossReferenceRSs-1)

PUCCH-PathlossReferenceRS-Id-v1610 ::= INTEGER (maxNrofPUCCH-PathlossReferenceRSs..maxNrofPUCCH-PathlossReferenceRSs-1-r16)

PUCCH-PathlossReferenceRS-Id-r17 ::= INTEGER (0..maxNrofPUCCH-PathlossReferenceRSs-1-r17)

-- TAG-PUCCH-PATHLOSSREFERENCERS-ID-STOP
-- ASN1STOP
```

PUCCH-PowerControl

The IE *PUCCH-PowerControl* is used to configure UE-specific parameters for the power control of PUCCH.

PUCCH-PowerControl information element

```
-- ASN1START
-- TAG-PUCCH-POWERCONTROL-START
PUCCH-PowerControl ::=
                                    SEQUENCE {
                                        INTEGER (-16..15)
                                                                                                                 OPTIONAL, -- Need R
    deltaF-PUCCH-f0
   deltaF-PUCCH-f1
                                        INTEGER (-16..15)
                                                                                                                 OPTIONAL, -- Need R
                                                                                                                 OPTIONAL, -- Need R
    deltaF-PUCCH-f2
                                        INTEGER (-16..15)
    deltaF-PUCCH-f3
                                        INTEGER (-16..15)
                                                                                                                 OPTIONAL, -- Need R
    deltaF-PUCCH-f4
                                        INTEGER (-16..15)
                                                                                                                 OPTIONAL, -- Need R
    p0-Set
                                        SEQUENCE (SIZE (1..maxNrofPUCCH-P0-PerSet)) OF P0-PUCCH
                                                                                                                 OPTIONAL, -- Need M
   pathlossReferenceRSs
                                        SEQUENCE (SIZE (1..maxNrofPUCCH-PathlossReferenceRSs)) OF PUCCH-PathlossReferenceRS
                                                                                                                 OPTIONAL, -- Need M
                                        ENUMERATED {twoStates}
    twoPUCCH-PC-AdjustmentStates
                                                                                                                 OPTIONAL, -- Need S
    ] ]
    pathlossReferenceRSs-v1610
                                        SetupRelease { PathlossReferenceRSs-v1610 }
                                                                                                                 OPTIONAL -- Need M
```

```
PO-PUCCH ::=
                                        SEOUENCE {
    p0-PUCCH-Id
                                            PO-PUCCH-Id,
                                            INTEGER (-16..15)
    p0-PUCCH-Value
P0-PUCCH-Id ::=
                                        INTEGER (1..8)
PathlossReferenceRSs-v1610 ::=
                                        SEQUENCE (SIZE (1..maxNrofPUCCH-PathlossReferenceRSsDiff-r16)) OF PUCCH-PathlossReferenceRS-r16
PUCCH-PathlossReferenceRS ::=
                                                SEQUENCE {
    pucch-PathlossReferenceRS-Id
                                                PUCCH-PathlossReferenceRS-Id,
    referenceSignal
                                                CHOICE {
        ssb-Index
                                                    SSB-Index,
        csi-RS-Index
                                                    NZP-CSI-RS-ResourceId
PUCCH-PathlossReferenceRS-r16 ::=
                                                    SEOUENCE {
    pucch-PathlossReferenceRS-Id-r16
                                                        PUCCH-PathlossReferenceRS-Id-v1610,
    referenceSignal-r16
                                                        CHOICE {
        ssb-Index-r16
                                                            SSB-Index,
        csi-RS-Index-r16
                                                            NZP-CSI-RS-ResourceId
PUCCH-PowerControlSetInfo-r17 ::=
                                        SEOUENCE {
    pucch-PowerControlSetInfoId-r17
                                            PUCCH-PowerControlSetInfoId-r17,
    p0-PUCCH-Id-r17
                                            P0-PUCCH-Id,
                                            ENUMERATED { i0, i1 },
    pucch-ClosedLoopIndex-r17
                                            PUCCH-PathlossReferenceRS-Id-r17
    pucch-PathlossReferenceRS-Id-r17
PUCCH-PowerControlSetInfoId-r17 ::=
                                        INTEGER (1.. maxNrofPowerControlSetInfos-r17)
-- TAG-PUCCH-POWERCONTROL-STOP
-- ASN1STOP
```

P0-PUCCH field descriptions

p0-PUCCH-Value

P0 value for PUCCH with 1dB step size.

PUCCH-PowerControl field descriptions deltaF-PUCCH-f0 deltaF for PUCCH format 0 with 1dB step size (see TS 38.213 [13], clause 7.2). deltaF-PUCCH-f1 deltaF for PUCCH format 1 with 1dB step size (see TS 38.213 [13], clause 7.2). deltaF-PUCCH-f2 deltaF for PUCCH format 2 with 1dB step size (see TS 38.213 [13], clause 7.2). deltaF-PUCCH-f3 deltaF for PUCCH format 3 with 1dB step size (see TS 38.213 [13], clause 7.2). deltaF-PUCCH-f4 deltaF-PUCCH-f4 deltaF for PUCCH format 4 with 1dB step size (see TS 38.213 [13], clause 7.2). p0-Set A set with dedicated P0 values for PUCCH, i.e., {P01, P02,...} { (see TS 38.213 [13], clause 7.2).

pathlossReferenceRSs. pathlossReferenceRSs-v1610

A set of Reference Signals (e.g. a CSI-RS config or a SS block) to be used for PUCCH pathloss estimation. Up to *maxNrofPUCCH-PathlossReference-RSs* may be configured. If the field is not configured, the UE uses the SSB as reference signal (see TS 38.213 [13], clause 7.2). The set includes Reference Signals indicated in pathlossReferenceRSs (without suffix) and in pathlossReferenceRSs-v1610. The UE maintains *pathlossReferenceRSs* and *pathlossReferenceRSs-v1610* separately: Receiving *pathlossReferenceRSs-v1610* set to *release* releases only the entries that were configured by *pathlossReferenceRSs-v1610*, and receiving *pathlossReferenceRSs-v1610* set to *setup* replaces only the entries that were configured by *pathlossReferenceRSs-v1610* with the newly signalled entries.

twoPUCCH-PC-AdjustmentStates

Number of PUCCH power control adjustment states maintained by the UE (i.e., g(i)). If the field is present (n2) the UE maintains two power control states (i.e., g(i,0) and g(i,1)). If the field is absent, it maintains one power control state (i.e., g(i,0)) (see TS 38.213 [13], clause 7.2).

PUCCH-SpatialRelationInfo

The IE *PUCCH-SpatialRelationInfo* is used to configure the spatial setting for PUCCH transmission and the parameters for PUCCH power control, see TS 38.213, [13], clause 9.2.2.

PUCCH-SpatialRelationInfo information element

```
-- ASN1START
-- TAG-PUCCH-SPATIALRELATIONINFO-START
PUCCH-SpatialRelationInfo ::=
                                        SEOUENCE {
                                        PUCCH-SpatialRelationInfoId,
    pucch-SpatialRelationInfoId
    servingCellId
                                            ServCellIndex
                                                                                                              OPTIONAL, -- Need S
   referenceSignal
                                            CHOICE {
       ssb-Index
                                                SSB-Index,
       csi-RS-Index
                                                NZP-CSI-RS-ResourceId,
                                                PUCCH-SRS
   pucch-PathlossReferenceRS-Id
                                            PUCCH-PathlossReferenceRS-Id,
   p0-PUCCH-Id
                                            PO-PUCCH-Id,
    closedLoopIndex
                                            ENUMERATED { i0, i1 }
PUCCH-SpatialRelationInfoExt-r16 ::=
                                           SEOUENCE {
```

OPTIONAL, --Need R

-- Need S

OPTIONAL,

PUCCH-SpatialRelationInfo field descriptions

pucch-PathLossReferenceRS-Id

When pucch-PathLossReferenceRS-Id-v1610 is configured, the UE shall ignore pucch-PathLossReferenceRS-Id (without suffix).

pucch-SpatialRelationInfold

When pucch-SpatialRelationInfold-v1610 is configured, the UE shall ignore pucch-SpatialRelationInfold (without suffix). If pucch-SpatialRelationInfold-v1610 is absent, the UE shall use the pucch-SpatialRelationInfold (without suffix).

servingCellId

If the field is absent, the UE applies the ServCellId of the serving cell in which this PUCCH-SpatialRelationInfo is configured

PUCCH-SpatialRelationInfo-Id

The IE PUCCH-SpatialRelationInfo-Id is used to identify a PUCCH-SpatialRelationInfo

PUCCH-SpatialRelationInfo-Id information element

```
-- ASN1START
-- TAG-PUCCH-SPATIALRELATIONINFO-START

PUCCH-SpatialRelationInfold ::= INTEGER (1..maxNrofSpatialRelationInfos)

PUCCH-SpatialRelationInfold-r16 ::= INTEGER (1..maxNrofSpatialRelationInfos-r16)

PUCCH-SpatialRelationInfold-v1610::= INTEGER (maxNrofSpatialRelationInfos-plus-1..maxNrofSpatialRelationInfos-r16)

-- TAG-PUCCH-SPATIALRELATIONINFO-STOP
-- ASN1STOP
```

PUCCH-TPC-CommandConfig

The IE PUCCH-TPC-CommandConfig is used to configure the UE for extracting TPC commands for PUCCH from a group-TPC messages on DCI.

PUCCH-TPC-CommandConfig information element

```
-- ASN1START
-- TAG-PUCCH-TPC-COMMANDCONFIG-START
PUCCH-TPC-CommandConfig ::=
                                     SEQUENCE {
                                     INTEGER (1..15)
   tpc-IndexPCell
                                                                               OPTIONAL, -- Cond PDCCH-OfSpcell
                                                                               OPTIONAL, -- Cond PDCCH-ofSpCellOrPUCCH-SCell
   tpc-IndexPUCCH-SCell
                                         INTEGER (1..15)
   1.1
   tpc-IndexPUCCH-sSCell-r17
                                                       INTEGER (1..15)
                                                                                             OPTIONAL, -- Need R
    tpc-IndexPUCCH-sScellSecondaryPUCCHgroup-r17
                                                      INTEGER (1..15)
                                                                                            OPTIONAL -- Cond twoPUCCHgroup
-- TAG-PUCCH-TPC-COMMANDCONFIG-STOP
-- ASN1STOP
```

PUCCH-TPC-CommandConfig field descriptions

tpc-IndexPCell

An index determining the position of the first bit of TPC command (applicable to the SpCell) inside the DCI format 2-2 payload.

tpc-IndexPUCCH-SCell

An index determining the position of the first bit of TPC command (applicable to the PUCCH SCell) inside the DCI format 2-2 payload.

tpc-IndexPUCCH-sSCell, tpc-IndexPUCCH-sSCellSecondaryPUCCHgroup

An index determining the position of the first bit of TPC command (applicable to the alternative PUCCH cell for PUCCH cell switching) inside the DCI format 2-2 payload, for the primary PUCCH group and the secondary PUCCH group respectively.

Conditional Presence	Explanation
PDCCH-OfSpcell	The field is mandatory present if the PUCCH-TPC-CommandConfig is provided in the PDCCH-Config for the SpCell.
	Otherwise, the field is absent, Need R.
PDCCH-ofSpCellOrPUCCH-SCell	The field is mandatory present if the PUCCH-TPC-CommandConfig is provided in the PDCCH-Config for the PUCCH-SCell.
	The field is optionally present, need R, if the UE is configured with a PUCCH SCell in this cell group and if the PUCCH-TPC-
	CommandConfig is provided in the PDCCH-Config for the SpCell.
	Otherwise, the field is absent, Need R.
twoPUCCHgroup	This field is optionally present, Need R, if secondary PUCCH group is configured. It is absent otherwise.

PUSCH-Config

The IE *PUSCH-Config* is used to configure the UE specific PUSCH parameters applicable to a particular BWP.

PUSCH-Config information element

```
-- ASN1START
-- TAG-PUSCH-CONFIG-START
```

```
PUSCH-Config ::=
                                        SEOUENCE {
    dataScramblingIdentityPUSCH
                                            INTEGER (0..1023)
                                                                                                                OPTIONAL.
                                                                                                                            -- Need S
    txConfig
                                            ENUMERATED {codebook, nonCodebook}
                                                                                                                OPTIONAL.
                                                                                                                            -- Need S
                                            SetupRelease { DMRS-UplinkConfig
    dmrs-UplinkForPUSCH-MappingTypeA
                                                                                                                OPTIONAL.
                                                                                                                            -- Need M
    dmrs-UplinkForPUSCH-MappingTypeB
                                            SetupRelease { DMRS-UplinkConfig }
                                                                                                                OPTIONAL.
                                                                                                                            -- Need M
                                            PUSCH-PowerControl
                                                                                                                            -- Need M
    pusch-PowerControl
                                                                                                                OPTIONAL,
    frequencyHopping
                                            ENUMERATED {intraSlot, interSlot}
                                                                                                                OPTIONAL.
                                                                                                                            -- Need S
    frequencyHoppingOffsetLists
                                            SEOUENCE (SIZE (1..4)) OF INTEGER (1.. maxNrofPhysicalResourceBlocks-1)
                                                                                                                OPTIONAL,
                                                                                                                            -- Need M
                                            ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch},
    resourceAllocation
    pusch-TimeDomainAllocationList
                                            SetupRelease { PUSCH-TimeDomainResourceAllocationList }
                                                                                                                OPTIONAL,
                                                                                                                            -- Need M
    pusch-AggregationFactor
                                            ENUMERATED { n2, n4, n8 }
                                                                                                                OPTIONAL,
                                                                                                                            -- Need S
                                            ENUMERATED {qam256, qam64LowSE}
                                                                                                                            -- Need S
   mcs-Table
                                                                                                                OPTIONAL,
    mcs-TableTransformPrecoder
                                            ENUMERATED {gam256, gam64LowSE}
                                                                                                                OPTIONAL.
                                                                                                                            -- Need S
    transformPrecoder
                                            ENUMERATED {enabled, disabled}
                                                                                                                OPTIONAL.
                                                                                                                            -- Need S
                                            ENUMERATED {fullyAndPartialAndNonCoherent, partialAndNonCoherent, nonCoherent}
    codebookSubset.
                                                                                                          OPTIONAL, -- Cond codebookBased
    maxRank
                                            INTEGER (1..4)
                                                                                                          OPTIONAL, -- Cond codebookBased
                                            ENUMERATED { config2}
    rbq-Size
                                                                                                          OPTIONAL, -- Need S
                                            SetupRelease { UCI-OnPUSCH}
                                                                                                          OPTIONAL, -- Need M
    uci-OnPUSCH
    tp-pi2BPSK
                                            ENUMERATED {enabled}
                                                                                                          OPTIONAL, -- Need S
    . . . ,
    11
    minimumSchedulingOffsetK2-r16
                                            SetupRelease { MinSchedulingOffsetK2-Values-r16 }
                                                                                                          OPTIONAL, -- Need M
    ul-AccessConfigListDCI-0-1-r16
                                            SetupRelease { UL-AccessConfigListDCI-0-1-r16 }
                                                                                                          OPTIONAL, -- Need M
    -- Start of the parameters for DCI format 0 2 introduced in V16.1.0
    harg-ProcessNumberSizeDCI-0-2-r16
                                                            INTEGER (0..4)
                                                                                                          OPTIONAL, -- Need R
    dmrs-SequenceInitializationDCI-0-2-r16
                                                            ENUMERATED {enabled}
                                                                                                          OPTIONAL,
                                                                                                                     -- Need S
                                                            INTEGER (0..2)
    numberOfBitsForRV-DCI-0-2-r16
                                                                                                          OPTIONAL, -- Need R
                                                            ENUMERATED {enabled}
    antennaPortsFieldPresenceDCI-0-2-r16
                                                                                                          OPTIONAL, -- Need S
                                                                                                                     -- Need M
    dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2-r16
                                                            SetupRelease { DMRS-UplinkConfig
                                                                                                          OPTIONAL,
                                                            SetupRelease { DMRS-UplinkConfig }
                                                                                                                     -- Need M
    dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2-r16
                                                                                                          OPTIONAL,
    frequencyHoppingDCI-0-2-r16
                                                            CHOICE {
        pusch-RepTypeA
                                                                ENUMERATED {intraSlot, interSlot},
        pusch-RepTypeB
                                                                ENUMERATED {interRepetition, interSlot}
                                                                                                          OPTIONAL, -- Need S
    frequencyHoppingOffsetListsDCI-0-2-r16 SetupRelease { FrequencyHoppingOffsetListsDCI-0-2-r16}
                                                                                                          OPTIONAL, -- Need M
    codebookSubsetDCI-0-2-r16
                                            ENUMERATED {fullyAndPartialAndNonCoherent, partialAndNonCoherent, nonCoherent}
                                                                                                          OPTIONAL, -- Cond codebookBased
    invalidSymbolPatternIndicatorDCI-0-2-r16
                                                            ENUMERATED {enabled}
                                                                                                          OPTIONAL, -- Need S
                                                                                                          OPTIONAL, -- Cond codebookBased
    maxRankDCI-0-2-r16
                                                            INTEGER (1..4)
                                                                                                                     -- Need S
    mcs-TableDCI-0-2-r16
                                                            ENUMERATED {qam256, qam64LowSE}
                                                                                                          OPTIONAL,
    mcs-TableTransformPrecoderDCI-0-2-r16
                                                            ENUMERATED { qam256, qam64LowSE }
                                                                                                          OPTIONAL, -- Need S
                                                                       {enabled}
                                                                                                          OPTIONAL, -- Need S
    priorityIndicatorDCI-0-2-r16
                                                            ENUMERATED
    pusch-RepTypeIndicatorDCI-0-2-r16
                                                                         pusch-RepTypeA, pusch-RepTypeB} OPTIONAL, -- Need R
                                                            ENUMERATED
    resourceAllocationDCI-0-2-r16
                                                            ENUMERATED
                                                                       { resourceAllocationType0, resourceAllocationType1, dynamicSwitch}
                                                                                                          OPTIONAL, -- Need M
                                                                                                                      -- Need S
    resourceAllocationType1GranularityDCI-0-2-r16
                                                            ENUMERATED { n2,n4,n8,n16 }
                                                                                                          OPTIONAL,
    uci-OnPUSCH-ListDCI-0-2-r16
                                                            SetupRelease { UCI-OnPUSCH-ListDCI-0-2-r16}
                                                                                                          OPTIONAL,
                                                                                                                      -- Need M
    pusch-TimeDomainAllocationListDCI-0-2-r16
                                                            SetupRelease { PUSCH-TimeDomainResourceAllocationList-r16 }
                                                                                                          OPTIONAL, -- Need M
    -- End of the parameters for DCI format 0 2 introduced in V16.1.0
    -- Start of the parameters for DCI format 0_1 introduced in V16.1.0
                                                            SetupRelease { PUSCH-TimeDomainResourceAllocationList-r16 }
    pusch-TimeDomainAllocationListDCI-0-1-r16
```

```
OPTIONAL,
                                                                                                                      -- Need M
    invalidSymbolPatternIndicatorDCI-0-1-r16
                                                      ENUMERATED {enabled}
                                                                                                          OPTIONAL.
                                                                                                                      -- Need S
    priorityIndicatorDCI-0-1-r16
                                                      ENUMERATED {enabled}
                                                                                                          OPTIONAL.
                                                                                                                      -- Need S
                                                                                                                      -- Need R
    pusch-RepTypeIndicatorDCI-0-1-r16
                                                      ENUMERATED { pusch-RepTypeA, pusch-RepTypeB}
                                                                                                          OPTIONAL.
    frequencyHoppingDCI-0-1-r16
                                                ENUMERATED {interRepetition, interSlot}
                                                                                                          OPTIONAL.
                                                                                                                      -- Cond RepTypeB
    uci-OnPUSCH-ListDCI-0-1-r16
                                                SetupRelease { UCI-OnPUSCH-ListDCI-0-1-r16 }
                                                                                                          OPTIONAL, -- Need M
    -- End of the parameters for DCI format 0 1 introduced in V16.1.0
    invalidSvmbolPattern-r16
                                                InvalidSymbolPattern-r16
                                                                                                          OPTIONAL,
                                                                                                                      -- Need S
    pusch-PowerControl-v1610
                                            SetupRelease {PUSCH-PowerControl-v1610}
                                                                                                          OPTIONAL,
                                                                                                                      -- Need M
    ul-FullPowerTransmission-r16
                                            ENUMERATED {fullpower, fullpowerMode1, fullpowerMode2}
                                                                                                                       -- Need R
                                                                                                           OPTIONAL,
    pusch-TimeDomainAllocationListForMultiPUSCH-r16 SetupRelease { PUSCH-TimeDomainResourceAllocationList-r16 }
                                                                                                          OPTIONAL, -- Need M
                                                                                                          OPTIONAL
                                                                                                                      -- Cond RepTypeB2
    numberOfInvalidSymbolsForDL-UL-Switching-r16
                                                        INTEGER (1..4)
    11.
    ГΓ
    ul-AccessConfigListDCI-0-2-r17
                                            SetupRelease
                                                           UL-AccessConfigListDCI-0-2-r17 }
                                                                                                          OPTIONAL, -- Need M
    betaOffsetsCrossPri0-r17
                                            SetupRelease
                                                           BetaOffsetsCrossPriSel-r17
                                                                                                          OPTIONAL, -- Need M
                                                           BetaOffsetsCrossPriSel-r17
    betaOffsetsCrossPri1-r17
                                            SetupRelease
                                                                                                          OPTIONAL, -- Need M
                                            SetupRelease { BetaOffsetsCrossPriSelDCI-0-2-r17
    betaOffsetsCrossPri0DCI-0-2-r17
                                                                                                          OPTIONAL, -- Need M
                                                                                                          OPTIONAL, -- Need M
    betaOffsetsCrossPri1DCI-0-2-r17
                                            SetupRelease { BetaOffsetsCrossPriSelDCI-0-2-r17 }
    mappingPattern-r17
                                            ENUMERATED {cyclicMapping, sequentialMapping}
                                                                                                          OPTIONAL, -- Cond SRSsets
                                            ENUMERATED {enabled}
                                                                                                          OPTIONAL, -- Need R
    secondTPCFieldDCI-0-1-r17
                                            ENUMERATED {enabled}
                                                                                                          OPTIONAL, -- Need R
    secondTPCFieldDCI-0-2-r17
                                                                                                          OPTIONAL, -- Need R
    sequenceOffsetForRV-r17
                                            INTEGER (0..3)
    ul-AccessConfigListDCI-0-1-r17
                                            SetupRelease { UL-AccessConfigListDCI-0-1-r17 }
                                                                                                           OPTIONAL, -- Need M
    minimumSchedulingOffsetK2-r17
                                            SetupRelease { MinSchedulingOffsetK2-Values-r17 }
                                                                                                           OPTIONAL, -- Need M
    availableSlotCounting-r17
                                            ENUMERATED { enabled }
                                                                                                           OPTIONAL, -- Need S
                                            SetupRelease { DMRS-BundlingPUSCH-Config-r17 }
    dmrs-BundlingPUSCH-Config-r17
                                                                                                           OPTIONAL, -- Need M
                                            INTEGER (5)
                                                                                                           OPTIONAL, -- Need R
    harg-ProcessNumberSizeDCI-0-2-v1700
    harg-ProcessNumberSizeDCI-0-1-r17
                                            INTEGER (5)
                                                                                                           OPTIONAL, -- Need R
    mpe-ResourcePoolToAddModList-r17
                                           SEOUENCE (SIZE(1..maxMPE-Resources-r17)) OF MPE-Resource-r17
                                                                                                           OPTIONAL, -- Need N
    mpe-ResourcePoolToReleaseList-r17
                                           SEQUENCE (SIZE(1..maxMPE-Resources-r17)) OF MPE-ResourceId-r17 OPTIONAL -- Need N
    11
UCI-OnPUSCH ::=
                                        SEOUENCE {
    betaOffsets
                                            CHOICE {
                                            SEQUENCE (SIZE (4)) OF BetaOffsets,
        dynamic
        semiStatic
                                            BetaOffsets
                                                                                                      OPTIONAL, -- Need M
                                            ENUMERATED { f0p5, f0p65, f0p8, f1 }
    scaling
MinSchedulingOffsetK2-Values-r16 ::=
                                        SEQUENCE (SIZE (1..maxNrOfMinSchedulingOffsetValues-r16)) OF INTEGER (0..maxK2-SchedulingOffset-r16)
MinSchedulingOffsetK2-Values-r17 ::=
                                        SEQUENCE (SIZE (1..maxNrOfMinSchedulingOffsetValues-r16)) OF INTEGER (0..maxK2-SchedulingOffset-r17)
UCI-OnPUSCH-DCI-0-2-r16 ::=
                                        SEQUENCE {
    betaOffsetsDCI-0-2-r16
                                            CHOICE {
        dynamicDCI-0-2-r16
                                                CHOICE {
           oneBit-r16
                                                    SEQUENCE (SIZE (2)) OF BetaOffsets,
            twoBits-r16
                                                    SEQUENCE (SIZE (4)) OF BetaOffsets
        semiStaticDCI-0-2-r16
                                       BetaOffsets
```

```
OPTIONAL, -- Need M
    scalingDCI-0-2-r16
                                     ENUMERATED { f0p5, f0p65, f0p8, f1 }
FrequencyHoppingOffsetListsDCI-0-2-r16 ::= SEOUENCE (SIZE (1..4)) OF INTEGER (1.. maxNrofPhysicalResourceBlocks-1)
UCI-OnPUSCH-ListDCI-0-2-r16 ::= SEOUENCE (SIZE (1..2)) OF UCI-OnPUSCH-DCI-0-2-r16
UCI-OnPUSCH-ListDCI-0-1-r16 ::= SEQUENCE (SIZE (1..2)) OF UCI-OnPUSCH
UL-AccessConfigListDCI-0-1-r16 ::= SEQUENCE (SIZE (1..64)) OF INTEGER (0..63)
UL-AccessConfigListDCI-0-1-r17 ::= SEQUENCE (SIZE (1..3)) OF INTEGER (0..2)
UL-AccessConfigListDCI-0-2-r17 ::= SEQUENCE (SIZE (1..64)) OF INTEGER (0..63)
BetaOffsetsCrossPriSel-r17 ::= CHOICE {
    dynamic-r17
                   SEQUENCE (SIZE (4)) OF BetaOffsetsCrossPri-r17,
    semiStatic-r17
                          BetaOffsetsCrossPri-r17
BetaOffsetsCrossPriSelDCI-0-2-r17 ::= CHOICE {
    oneBit-r17
                              SEQUENCE (SIZE (2)) OF BetaOffsetsCrossPri-r17.
       twoBits-r17
                              SEQUENCE (SIZE (4)) OF BetaOffsetsCrossPri-r17
    semiStaticDCI-0-2-r17 BetaOffsetsCrossPri-r17
MPE-Resource-r17 ::=
                          SEOUENCE {
   mpe-ResourceId-r17
                              MPE-ResourceId-r17,
    cell-r17
                              ServCellIndex
                                                                                                  OPTIONAL,
                                                                                                             -- Need R
    additionalPCI-r17
                           AdditionalPCIIndex-r17
                                                                                                  OPTIONAL,
                                                                                                              -- Need R
   mpe-ReferenceSignal-r17
                              CHOICE {
                              NZP-CSI-RS-ResourceId,
       csi-RS-Resource-r17
       ssb-Resource-r17
                                  SSB-Index
MPE-ResourceId-r17 ::=
                          INTEGER (1..maxMPE-Resources-r17)
-- TAG-PUSCH-CONFIG-STOP
-- ASN1STOP
```

PUSCH-Config field descriptions

antennaPortsFieldPresenceDCI-0-2

Configure the presence of "Antenna ports" field in DCI format 0_2. When the field is configured, then the "Antenna ports" field is present in DCI format 0_2. Otherwise, the field size is set to 0 for DCI format 0_2 (See TS 38.212 [17], clause 7.3.1.1.3). If neither dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2 nor dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2 is configured, this field is absent.

availableSlotCounting

Indicate whether PUSCH repetitions counted on the basis of available slots is enabled. If the field is absent, PUSCH repetitions counted on the basis of available slots is disabled.

betaOffsetsCrossPri0. betaOffsetsCrossPri1. betaOffsetsCrossPri0DCI-0-2. betaOffsetsCrossPri1DCI-0-2

Selection between and configuration of dynamic and semi-static beta-offset for multiplexing HARQ-ACK on dynamically scheduled PUSCH with different priorities, see TS 38.213 [13], clause 9.3.

The field beta Offsets Cross Prio 0 indicates multiplexing low priority (LP) HARQ-ACK on dynamically scheduled high priority (HP) PUSCH.

The field beta Offsets Cross Prio1 indicates multiplexing HP HARQ-ACK on dynamically scheduled LP PUSCH.

The field beta Offsets Cross Prio 0DCI-0-2 indicates multiplexing LP HARQ-ACK on dynamically scheduled HP PUSCH by DCI format 0 2.

The field beta Offsets Cross Prio 1DCI-0-2 indicates multiplexing HP HARQ-ACK on dynamically scheduled LP PUSCH by DCI format 0_2.

codebookSubset, codebookSubsetDCI-0-2

Subset of PMIs addressed by TPMI, where PMIs are those supported by UEs with maximum coherence capabilities (see TS 38.214 [19], clause 6.1.1.1). The field codebookSubset applies to DCI format 0_1 and the field codebookSubsetDCI-0-2 applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.1.1).

dataScramblingIdentityPUSCH

Identifier used to initialise data scrambling (c_init) for PUSCH. If the field is absent, the UE applies the physical cell ID. (see TS 38.211 [16], clause 6.3.1.1).

dmrs-BundlingPUSCH-Config

Configure the parameters for DMRS bundling for PUSCH (see TS 38.214 [19], clause 6.1.7). In this release, this is not applicable to FR2-2.

dmrs-SequenceInitializationDCI-0-2

Configure whether the field "DMRS Sequence Initialization" is present or not in DCI format 0_2. If the field is absent, then 0 bit for the field "DMRS Sequence Initialization" in DCI format 0_2. If the field is present, then the number of bits is determined in the same way as DCI format 0_1 (see TS 38.212 [17], clause 7.3.1).

dmrs-UplinkForPUSCH-MappingTypeA, dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2

DMRS configuration for PUSCH transmissions using PUSCH mapping type A (chosen dynamically via *PUSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-UplinkForPUSCH-MappingTypeA* applies to DCI format 0_1 and the field *dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2* applies to DCI format 0_2 (see TS 38.212 [17], clause 7.3.1).

dmrs-UplinkForPUSCH-MappingTypeB, dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2

DMRS configuration for PUSCH transmissions using PUSCH mapping type B (chosen dynamically via *PUSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-UplinkForPUSCH-MappingTypeB* applies to DCI format 0_1 and the field *dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2* applies to DCI format 0_2 (see TS 38.212 [17], clause 7.3.1).

frequencyHopping

The value *intraSlot* enables 'Intra-slot frequency hopping' and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured for 'pusch-RepTypeA' (see TS 38.214 [19], clause 6.3). The field *frequencyHopping* applies to DCI format 0_0 and 0_1 for 'pusch-RepTypeA'.

frequencyHoppingDCI-0-1

Indicates the frequency hopping scheme for DCI format 0_1 when *pusch-RepTypeIndicatorDCI-0-1* is set to 'pusch-RepTypeB', The value *interRepetition* enables 'Interrepetition frequency hopping', and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured for DCI format 0_1 for 'pusch-RepTypeB' (see TS 38.214 [19], clause 6.1).

frequencyHoppingDCI-0-2

Indicate the frequency hopping scheme for DCI format 0_2. The value *intraSlot* enables 'intra-slot frequency hopping', and the value *interRepetition* enables 'Inter-repetition frequency hopping', and the value *interSlot* enables 'Inter-slot frequency hopping'. When *pusch-RepTypeIndicatorDCI-0-2* is not set to '*pusch-RepTypeB'*, the frequency hopping scheme can be chosen between 'intra-slot frequency hopping and 'inter-slot frequency hopping' if enabled. When *pusch-RepTypeIndicatorDCI-0-2* is set to '*pusch-RepTypeB'*, the frequency hopping scheme can be chosen between 'inter-repetition frequency hopping' and 'inter-slot frequency hopping' if enabled. If the field is absent, frequency hopping is not configured for DCI format 0_2 (see TS 38.214 [19], clause 6.3).

frequencyHoppingOffsetLists, frequencyHoppingOffsetListsDCI-0-2

Set of frequency hopping offsets used when frequency hopping is enabled for granted transmission (not msg3) and type 2 configured grant activation (see TS 38.214 [19], clause 6.3). The field *frequencyHoppingOffsetLists* applies to DCI format 0_0 and DCI format 0_1 and the field *frequencyHoppingOffsetListsDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19], clause 6.3).

harq-ProcessNumberSizeDCI-0-2

Configure the number of bits for the field "HARQ process number" in DCI format 0_2 (see TS 38.212 [17], clause 7.3.1).

invalidSvmbolPattern

Indicates one pattern for invalid symbols for PUSCH transmission repetition type B applicable to both DCI format 0_1 and 0_2. If *InvalidSymbolPattern* is not configured, semi-static flexible symbols are used for PUSCH. Segmentation occurs only around semi-static DL symbols (see TS 38.214 [19] clause 6.1).

invalidSymbolPatternIndicatorDCI-0-1, invalidSymbolPatternIndicatorDCI-0-2

Indicates the presence of an additional bit in the DCI format 0_1/0_2. If *invalidSymbolPattern* is absent, then both *invalidSymbolPatternIndicatorDCI-0-1* and *invalidSymbolPatternIndicatorDCI-0-2* are absent. The field *invalidSymbolPatternIndicatorDCI-0-1* applies to the DCI format 0_1 and the field *invalidSymbolPatternIndicatorDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19] clause 6.1). If the field is absent, the UE behaviour is specified in TS 38.214 [19], clause 6.1.2.1.

mappingPattern

Indicates whether the UE should follow Cyclical mapping pattern or Sequential mapping pattern for when two SRS resource sets are configured in srs-ResourceSetToAddModList or srs-ResourceSetToAddModListOCI-0-2 with usage 'codebook' or 'noncodebook' for PUSCH transmission and the PUSCH transmission occasions are associated with both SRS resource sets.

maxRank, maxRankDCI-0-2

Subset of PMIs addressed by TRIs from 1 to ULmaxRank (see TS 38.214 [19], clause 6.1.1.1). The field maxRank applies to DCI format 0_1 and the field maxRankDCI-0-2 applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.1.1).

mcs-Table, mcs-TableFormat0-2

Indicates which MCS table the UE shall use for PUSCH without transform precoder (see TS 38.214 [19], clause 6.1.4.1). If the field is absent the UE applies the value 64QAM. The field mcs-Table applies to DCI format 0_0 and DCI format 0_1 and the field mcs-TableDCI-0-2 applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.4.1).

mcs-TableTransformPrecoder, mcs-TableTransformPrecoderDCI-0-2

Indicates which MCS table the UE shall use for PUSCH with transform precoding (see TS 38.214 [19], clause 6.1.4.1) If the field is absent the UE applies the value 64QAM. The field mcs-TableTransformPrecoder applies to DCI format 0_0 and DCI format 0_1 and the field mcs-TableTransformPrecoderDCI-0-2 applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.4.1).

minimumSchedulingOffsetK2

List of minimum K2 values. Minimum K2 parameter denotes minimum applicable value(s) for the *Time domain resource assignment* table for PUSCH (see TS 38.214 [19], clause 6.1.2.1).

mpe-ResourcePoolToAddModList

List of SSB/CSI-RS resources for P-MPR reporting. Each resource is configured with serving cell index where the resource is configured for the UE. The *additionalPCI* is configured only if the resource is SSB. For each resource, if neither *cell* nor *additionalPCI* is present, the SSB/CSI-RS resource is from the serving cell where the *PUSCH-Config* is configured.

numberOfBitsRV-DCI-0-2

Configures the number of bits for "Redundancy version" in the DCI format 0 2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 6.1.2.1).

numberOfInvalidSymbolsForDL-UL-Switching

Indicates the number of symbols after the last semi-static DL symbol that are invalid symbols for PUSCH repetition Type B. If it is absent, no symbol is explicitly defined for DL-to-UL switching (see TS 38.214 [19], clause 6.1).

priorityIndicatorDCI-0-1, priorityIndicatorDCI-0-2

Configures the presence of "priority indicator" in DCI format 0_1/0_2. When the field is absent in the IE, then the UE shall apply 0 bit for "Priority indicator" in DCI format 0_1/0_2. The field *priorityIndicatorDCI-0-1* applies to DCI format 0_1 and the field *priorityIndicatorDCI-0-2* applies to DCI format 0_2 (see TS 38.212 [17] clause 7.3.1 and TS 38.213 [13] clause 9).

pusch-AggregationFactor

Number of repetitions for data (see TS 38.214 [19], clause 6.1.2.1). If the field is absent the UE applies the value 1.

pusch-PowerControl

Configures power control parameters PUSCH transmission. This field is not configured if unifiedTCI-StateType is configured for the serving cell.

pusch-RepTypeIndicatorDCI-0-1, pusch-RepTypeIndicatorDCI-0-2

Indicates whether UE follows the behavior for "PUSCH repetition type A" or the behavior for "PUSCH repetition type B" for the PUSCH scheduled by DCI format 0_1/0_2 and for Type 2 CG associated with the activating DCI format 0_1/0_2. The value *pusch-RepTypeA* enables the 'PUSCH repetition type A' and the value *pusch-RepTypeB* enables the 'PUSCH repetition type B'. The field *pusch-RepTypeIndicatorDCI-0-1* applies to DCI format 0_1 and the field *pusch-RepTypeIndicatorDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.2.1).

pusch-TimeDomainAllocationList

List of time domain allocations for timing of UL assignment to UL data (see TS 38.214 [19], table 6.1.2.1.1-1). The field *pusch-TimeDomainAllocationList* applies to DCI formats 0_0 or DCI format 0_1 when the field *pusch-TimeDomainAllocationListDCI-0-1* is not configured (see TS 38.214 [19], table 6.1.2.1.1-1 and table 6.1.2.1.1-1A). The network does not configure the *pusch-TimeDomainAllocationList* (without suffix) simultaneously with the *pusch-TimeDomainAllocationListDCI-0-2-r16* or *pusch-TimeDomainAllocationListDCI-0-1-r16* or *pusch-TimeDomainAllocationListDCI-0-1-r16*.

pusch-TimeDomainAllocationListDCI-0-1

Configuration of the time domain resource allocation (TDRA) table for DCI format 0_1 (see TS 38.214 [19], clause 6.1, table 6.1.2.1.1-1A).

pusch-TimeDomainAllocationListDCI-0-2

Configuration of the time domain resource allocation (TDRA) table for DCI format 0_2 (see TS 38.214 [19], clause 6.1.2, table 6.1.2.1.1-1B).

pusch-TimeDomainAllocationListForMultiPUSCH

Configuration of the time domain resource allocation (TDRA) table for multiple PUSCH (see TS 38.214 [19], clause 6.1.2). The network configures at most 16 rows in this TDRA table in *PUSCH-TimeDomainResourceAllocationList-r16* configured by this field. This field is not configured simultaneously with *pusch-AggregationFactor*.

rbg-Size

Selection between configuration 1 and configuration 2 for RBG size for PUSCH. The UE does not apply this field if *resourceAllocation* is set to *resourceAllocationType1*. Otherwise, the UE applies the value *config1* when the field is absent (see TS 38.214 [19], clause 6.1.2.2.1).

resourceAllocation, resourceAllocationDCI-0-2

Configuration of resource allocation type 0 and resource allocation type 1 for non-fallback DCI (see TS 38.214 [19], clause 6.1.2). The field *resourceAllocation* applies to DCI format 0_1 and the field *resourceAllocationDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.2).

resourceAllocationType1GranularityDCI-0-2

Configures the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 0_2. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 6.1.2.2.2).

secondTPCFieldDCI-0-1, secondTPCFieldDCI-0-2

A second TPC field can be configured via RRC for DCI-0-1 and DCI-0-2. Each TPC field is for each closed-loop index value respectively (i.e., 1st /2nd TPC fields correspond to "closedLoopIndex" value = 0 and 1,

sequenceOffsetForRV

Configures the RV offset for the starting RV for the first repetition (first actual repetition in PUSCH repetition Type B) towards the second 'SRS resource set' for PUSCH configured in either srs-ResourceSetToAddModList or srs-ResourceSetToAddModListOCI-0-2 with usage 'codebook' or 'noncodebook'.

tp-pi2BPSK

Enables pi/2-BPSK modulation with transform precoding if the field is present and disables it otherwise.

transformPrecoder

The UE specific selection of transformer precoder for PUSCH (see TS 38.214 [19], clause 6.1.3). When the field is absent the UE applies the value of the field *msg3-transformPrecoder* from *rach-ConfigCommon* included directly within BWP configuration (i.e., not included in *additionalRACH-ConfigList*).

txConfia

Whether UE uses codebook based or non-codebook based transmission (see TS 38.214 [19], clause 6.1.1). If the field is absent, the UE transmits PUSCH on one antenna port, see TS 38.214 [19], clause 6.1.1.

uci-OnPUSCH-ListDCI-0-1, uci-OnPUSCH-ListDCI-0-2

Configuration for up to 2 HARQ-ACK codebooks specific to DCI format 0_1/0_2. The field uci-OnPUSCH-ListDCI-0-1 applies to DCI format 0_1 and the field uci-OnPUSCH-ListDCI-0-2 applies to DCI format 0_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9.3).

ul-AccessConfigListDCI-0-1, ul-AccessConfigListDCI-0-2

List of the combinations of cyclic prefix extension, channel access priority class (CAPC), and UL channel access type (see TS 38.212 [17], clause 7.3.1) applicable for DCI format 0_1 and DCI format 0_2, respectively. The fields *ul-AccessConfigListDCI-0-1-r16* and *ul-AccessConfigListDCI-0-2-r17* are only applicable for FR1 (see TS 38.212 [17], Table 7.3.1.1.2-35). The field *ul-AccessConfigListDCI-0-1-r17* only contains a list of UL channel access types and is only applicable for FR2-2 (see TS 38.212 [17], Table 7.3.1.1.2-35A).

ul-FullPowerTransmission

Configures the UE with UL full power transmission mode as specified in TS 38.213 [13]. This field is not configured if *ul-powerControl* is configured in the *BWP-UplinkDedicated* in which the *PUCCH-Config* is included.

UCI-OnPUSCH field descriptions

betaOffsets

Selection between and configuration of dynamic and semi-static beta-offset for DCI formats other than DCI format 0_2. If the field is not configured, the UE applies the value 'semiStatic' (see TS 38.213 [13], clause 9.3).

scaling

Indicates a scaling factor to limit the number of resource elements assigned to UCI on PUSCH for DCI formats other than DCI format 0_2. Value *f0p5* corresponds to 0.5, value *f0p65* corresponds to 0.65, and so on. The value configured herein is applicable for PUSCH with configured grant (see TS 38.212 [17], clause 6.3).

UCI-OnPUSCH-DCI-0-2 field descriptions

betaOffsetsDCI-0-2

Configuration of beta-offset for DCI format 0_2. If semiStaticDCI-0-2 is chosen, the UE shall apply the value of 0 bit for the field of beta offset indicator in DCI format 0_2. If dynamicDCI-0-2 is chosen, the UE shall apply the value of 1 bit or 2 bits for the field of beta offset indicator in DCI format 0_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9.3).

dvnamicDCI-0-2

Indicates the UE applies the value 'dynamic' for DCI format 0_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.3).

semiStaticDCI-0-2

Indicates the UE applies the value 'semiStatic' for DCI format 0_2. (see TS 38.212 [17], clause 7.3.1 and see TS 38.213 [13], clause 9.3).

scalingDCI-0-2

Indicates a scaling factor to limit the number of resource elements assigned to UCI on PUSCH for DCI format 0_2. Value f0p5 corresponds to 0.5, value f0p65 corresponds to 0.65, and so on (see TS 38.212 [17], clause 6.3).

Conditional Presence	Explanation
codebookBased	The field is mandatory present if txConfig is set to codebook and absent otherwise.
RepTypeB	The field is optionally present, Need S, if <i>pusch-RepTypeIndicatorDCI-0-1</i> is set to pusch-RepTypeB. It is absent otherwise.
RepTypeB2	The field is optionally present, Need S, if pusch-RepTypeIndicatorDCI-0-1 or pusch-RepTypeIndicatorDCI-0-2 is set to
	pusch-RepTypeB. It is absent otherwise.
SRSsets	This field is mandatory present when UE is configured with two SRS sets in either srs-ResourceSetToAddModList or srs-
	ResourceSetToAddModListDCI-0-2 with usage codebook or non-codebook.

PUSCH-ConfigCommon

The IE *PUSCH-ConfigCommon* is used to configure the cell specific PUSCH parameters.

PUSCH-ConfigCommon information element

```
-- ASN1START
-- TAG-PUSCH-CONFIGCOMMON-START
PUSCH-ConfigCommon ::=
                                SEOUENCE {
   OPTIONAL, -- Need R
                                    PUSCH-TimeDomainResourceAllocationList
                                                                                            OPTIONAL, -- Need R
   pusch-TimeDomainAllocationList
   msq3-DeltaPreamble
                                                                                            OPTIONAL, -- Need R
                                    INTEGER (-1..6)
   p0-NominalWithGrant
                                    INTEGER (-202..24)
                                                                                            OPTIONAL, -- Need R
-- TAG-PUSCH-CONFIGCOMMON-STOP
-- ASN1STOP
```

PUSCH-ConfigCommon field descriptions

groupHoppingEnabledTransformPrecoding

For DMRS transmission with transform precoder, the NW may configure group hopping by this cell-specific parameter, see TS 38.211 [16], clause 6.4.1.1.1.2.

msg3-DeltaPreamble

Power offset between msg3 and RACH preamble transmission. Actual value = field value * 2 [dB] (see TS 38.213 [13], clause 7.1)

p0-NominalWithGrant

P0 value for PUSCH with grant (except msg3). Value in dBm. Only even values (step size 2) allowed (see TS 38.213 [13], clause 7.1) This field is cell specific

pusch-TimeDomainAllocationList

List of time domain allocations for timing of UL assignment to UL data (see TS 38.214 [19], table 6.1.2.1.1-1).

PUSCH-PowerControl

The IE *PUSCH-PowerControl* is used to configure UE specific power control parameter for PUSCH.

PUSCH-PowerControl information element

```
-- ASN1START
-- TAG-PUSCH-POWERCONTROL-START
PUSCH-PowerControl ::=
                                    SEOUENCE {
    tpc-Accumulation
                                        ENUMERATED { disabled }
                                                                                                                OPTIONAL, -- Need S
                                                                                                                OPTIONAL, -- Need S
    msg3-Alpha
                                        Alpha
   p0-NominalWithoutGrant
                                        INTEGER (-202..24)
                                                                                                                OPTIONAL, -- Need M
                                        SEQUENCE (SIZE (1..maxNrofP0-PUSCH-AlphaSets)) OF P0-PUSCH-AlphaSet
                                                                                                                OPTIONAL, -- Need M
    p0-AlphaSets
    pathlossReferenceRSToAddModList
                                        SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSs)) OF PUSCH-PathlossReferenceRS
                                                                                                                OPTIONAL, -- Need N
    pathlossReferenceRSToReleaseList
                                        SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSs)) OF PUSCH-PathlossReferenceRS-Id
                                                                                                                OPTIONAL, -- Need N
    twoPUSCH-PC-AdjustmentStates
                                        ENUMERATED {twoStates}
                                                                                                                OPTIONAL, -- Need S
                                        ENUMERATED {enabled}
                                                                                                                OPTIONAL, -- Need S
    deltaMCS
    sri-PUSCH-MappingToAddModList
                                        SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF SRI-PUSCH-PowerControl
                                                                                                                OPTIONAL, -- Need N
```

```
sri-PUSCH-MappingToReleaseList
                                        SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF SRI-PUSCH-PowerControlld
                                                                                                                 OPTIONAL -- Need N
PO-PUSCH-AlphaSet ::=
                                    SEQUENCE {
    p0-PUSCH-AlphaSetId
                                        PO-PUSCH-AlphaSetId,
    0g
                                        INTEGER (-16..15)
                                                                                                                 OPTIONAL, -- Need S
    alpha
                                        Alpha
                                                                                                                 OPTIONAL -- Need S
P0-PUSCH-AlphaSetId ::=
                                    INTEGER (0..maxNrofP0-PUSCH-AlphaSets-1)
PUSCH-PathlossReferenceRS ::=
                                    SEOUENCE {
    pusch-PathlossReferenceRS-Id
                                        PUSCH-PathlossReferenceRS-Id,
    referenceSignal
                                        CHOICE {
        ssb-Index
                                            SSB-Index,
        csi-RS-Index
                                            NZP-CSI-RS-ResourceId
PUSCH-PathlossReferenceRS-r16 ::= SEQUENCE {
    pusch-PathlossReferenceRS-Id-r16
                                        PUSCH-PathlossReferenceRS-Id-v1610,
    referenceSignal-r16
                                        CHOICE {
        ssb-Index-r16
                                            SSB-Index,
        csi-RS-Index-r16
                                            NZP-CSI-RS-ResourceId
DummyPathlossReferenceRS-v1710 ::= SEOUENCE {
    pusch-PathlossReferenceRS-Id-r17
                                        PUSCH-PathlossReferenceRS-Id-r17,
    additionalPCI-r17
                                        Additional PCI Index-r17
                                                                                                        OPTIONAL -- Need R
PUSCH-PathlossReferenceRS-Id ::=
                                    INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1)
PUSCH-PathlossReferenceRS-Id-v1610 ::= INTEGER (maxNrofPUSCH-PathlossReferenceRSs..maxNrofPUSCH-PathlossReferenceRSs-1-r16)
PUSCH-PathlossReferenceRS-Id-r17 ::= INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1-r16)
SRI-PUSCH-PowerControl ::=
                                    SEOUENCE {
    sri-PUSCH-PowerControlId
                                        SRI-PUSCH-PowerControlld,
    sri-PUSCH-PathlossReferenceRS-Id
                                        PUSCH-PathlossReferenceRS-Id,
                                        P0-PUSCH-AlphaSetId,
    sri-P0-PUSCH-AlphaSetId
                                        ENUMERATED { i0, i1 }
    sri-PUSCH-ClosedLoopIndex
SRI-PUSCH-PowerControlld ::=
                                    INTEGER (0..maxNrofSRI-PUSCH-Mappings-1)
PUSCH-PowerControl-v1610 ::=
                                    SEQUENCE {
    pathlossReferenceRSToAddModListSizeExt-v1610
                                                   SEQUENCE (SIZE (1...maxNrofPUSCH-PathlossReferenceRSsDiff-r16)) OF PUSCH-PathlossReferenceRS-r16
                                                                                                                 OPTIONAL, -- Need N
    pathlossReferenceRSToReleaseListSizeExt-v1610 SEQUENCE (SIZE (1...maxNrofPUSCH-PathlossReferenceRSsDiff-r16)) OF PUSCH-PathlossReferenceRS-Id-
v1610
                                                                                                                 OPTIONAL, -- Need N
```

```
p0-PUSCH-SetList-r16
                                        SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF PO-PUSCH-Set-r16
                                                                                                                 OPTIONAL, -- Need R
    olpc-ParameterSet
                                        SEQUENCE {
       olpc-ParameterSetDCI-0-1-r16
                                            INTEGER (1..2)
                                                                                                                 OPTIONAL. -- Need R
        olpc-ParameterSetDCI-0-2-r16
                                            INTEGER (1..2)
                                                                                                                 OPTIONAL -- Need R
                                                                                                                 OPTIONAL, -- Need M
    . . . ,
    [ [
    sri-PUSCH-MappingToAddModList2-r17 SEOUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF SRI-PUSCH-PowerControl
                                                                                                                 OPTIONAL, -- Need N
    sri-PUSCH-MappingToReleaseList2-r17 SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF SRI-PUSCH-PowerControlld OPTIONAL, -- Need N
    p0-PUSCH-SetList2-r17
                                        SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF P0-PUSCH-Set-r16
                                                                                                                 OPTIONAL, -- Need R
    dummy SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSs-r16)) OF DummyPathlossReferenceRS-v1710
                                                                                                                 OPTIONAL -- Need N
    11
PO-PUSCH-Set-r16 ::=
                                    SEOUENCE {
    p0-PUSCH-SetId-r16
                                        P0-PUSCH-SetId-r16,
                                        SEQUENCE (SIZE (1..maxNrofP0-PUSCH-Set-r16)) OF P0-PUSCH-r16
   p0-List-r16
                                                                                                                 OPTIONAL, -- Need R
    . . .
P0-PUSCH-SetId-r16 ::=
                                    INTEGER (0..maxNrofSRI-PUSCH-Mappings-1)
P0-PUSCH-r16 ::=
                                    INTEGER (-16..15)
-- TAG-PUSCH-POWERCONTROL-STOP
-- ASN1STOP
```

P0-PUSCH-AlphaSet field descriptions

alpha

alpha value for PUSCH with grant (except msg3) (see TS 38.213 [13], clause 7.1). When the field is absent the UE applies the value 1.

n0

P0 value for PUSCH with grant (except msg3) in steps of 1dB (see TS 38.213 [13], clause 7.1). When the field is absent the UE applies the value 0.

P0-PUSCH-Set field descriptions

p0-List

Configuration of {p0-PUSCH, p0-PUSCH} sets for PUSCH. If SRI is present in the DCI, then one p0-PUSCH can be configured in P0-PUSCH-Set. If SRI is not present in the DCI, and both *olpc-ParameterSetDCI-0-1* and *olpc-ParameterSetDCI-0-2* are configured to be 1 bit, then one p0-PUSCH can be configured in P0-PUSCH-Set. If SRI is not present in the DCI, and if any of *olpc-ParameterSetDCI-0-1* and *olpc-ParameterSetDCI-0-2* is configured to be 2 bits, then two p0-PUSCH values can be configured in P0-PUSCH-Set (see TS 38.213 [13] clause 7 and TS 38.212 [17] clause 7.3.1).

p0-PUSCH-SetId

Configure the index of a p0-PUSCH-Set (see TS 38.213 [13] clause 7 and TS 38.212 [17] clause 7.3.1).

PUSCH-PowerControl field descriptions

deltaMCS

Indicates whether to apply delta MCS. When the field is absent, the UE applies Ks = 0 in delta_TFC formula for PUSCH (see TS 38.213 [13], clause 7.1).

dummy

This field is not used in the specification. If received it shall be ignored by the UE.

msg3-Alpha

Dedicated alpha value for msg3 PUSCH (see TS 38.213 [13], clause 7.1). When the field is absent the UE applies the value 1.

olpc-ParameterSetDCI-0-1, olpc-ParameterSetDCI-0-2

Configures the number of bits for Open-loop power control parameter set indication for DCI format 0_1/0_2 in case SRI is not configured in the DCI. 2 bits is applicable only if SRI is not present in the DCI format 0_1. The field *olpc-ParameterSetDCI-0-1* applies to DCI format 0_1 and the field *olpc-ParameterSetDCI-0-2* applies to DCI format 0_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 11).

p0-AlphaSets

Configuration {p0-pusch, alpha} sets for PUSCH (except msg3 and msgA PUSCH), i.e., { {p0,alpha,index1}, {p0,alpha,index2},...} (see TS 38.213 [13], clause 7.1). When no set is configured, the UE uses the P0-nominal for msg3/msgA PUSCH, P0-UE is set to 0 and alpha is set according to either msg3-Alpha or msgA-Alpha (see TS 38.213 [13], clause 7.1).

p0-NominalWithoutGrant

P0 value for UL grant-free/SPS based PUSCH, Value in dBm, Only even values (step size 2) allowed (see TS 38,213 [13], clause 7.1).

p0-PUSCH-SetList

Configure one additional *P0-PUSCH-Set* per SRI. If present, the one bit or 2 bits in the DCI is used to dynamically indicate among the P0 value from the existing *P0-PUSCH-AlphaSet* and the P0 value(s) from the *P0-PUSCH-Set* (See TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 17).

p0-PUSCH-SetList2

For indicating per-TRP OLPC set in DCI format 0_1/0_2 with the legacy field, a second p0-PUSCH-SetList-r16 is used. When this field is present the *p0-PUSCH-SetList* corresponds to the first SRS resource set (see TS 38.213).

pathlossReferenceRSToAddModList, pathlossReferenceRSToAddModListSizeExt

A set of Reference Signals (e.g. a CSI-RS config or a SS block) to be used for PUSCH path loss estimation. The set consists of Reference Signals configured using pathLossReferenceRSToAddModList and Reference Signals configured using pathlossReferenceRSToAddModListSizeExt. Up to maxNrofPUSCH-PathlossReferenceRSs may be configured (see TS 38.213 [13], clause 7.1).

pathlossReferenceRSToReleaseList, pathlossReferenceRSToReleaseListSizeExt

Lists of reference signals for PUSCH path loss estimation to be released by the UE.

sri-PUSCH-MappingToAddModList

A list of SRI-PUSCH-PowerControl elements among which one is selected by the SRI field in DCI (see TS 38.213 [13], clause 7.1).

sri-PUSCH-MappingToAddModList2

A list of *SRI-PUSCH-PowerControl* elements for second SRS-resource set, among which one is selected by the SRI field in DCI (see TS 38.213 [13], clause 7.1). When this field is present the *sri-PUSCH-MappingToAddModList* corresponds to the first SRS resource set for PUSCH.

tpc-Accumulation

If enabled, UE applies TPC commands via accumulation. If not enabled, UE applies the TPC command without accumulation. If the field is absent, TPC accumulation is enabled (see TS 38.213 [13], clause 7.1).

twoPUSCH-PC-AdjustmentStates

Number of PUSCH power control adjustment states maintained by the UE (i.e., fc(i)). If the field is present (n2) the UE maintains two power control states (i.e., fc(i,0) and fc(i,1)). If the field is absent, it maintains one power control state (i.e., fc(i,0)) (see TS 38.213 [13], clause 7.1).

SRI-PUSCH-PowerControl field descriptions

sri-P0-PUSCH-AlphaSetId

The ID of a P0-PUSCH-AlphaSet as configured in p0-AlphaSets in PUSCH-PowerControl.

sri-PUSCH-ClosedLoopIndex

The index of the closed power control loop associated with this SRI-PUSCH-PowerControl.

sri-PUSCH-PathlossReferenceRS-Id

The ID of PUSCH-PathlossReferenceRS as configured in the pathlossReferenceRSToAddModList in PUSCH-PowerControl.

sri-PUSCH-PowerControlld

The ID of this SRI-PUSCH-PowerControl configuration. It is used as the codepoint (payload) in the SRI DCI field.

PUSCH-ServingCellConfig

The IE PUSCH-Serving CellConfig is used to configure UE specific PUSCH parameters that are common across the UE's BWPs of one serving cell.

PUSCH-ServingCellConfig information element

```
-- ASN1START
-- TAG-PUSCH-SERVINGCELLCONFIG-START
                                        SEQUENCE {
PUSCH-ServingCellConfig ::=
    codeBlockGroupTransmission
                                            SetupRelease { PUSCH-CodeBlockGroupTransmission }
                                                                                                    OPTIONAL, -- Need M
                                                                                                    OPTIONAL, -- Need S
                                            ENUMERATED {limitedBufferRM}
    rateMatching
                                                                                                               -- Need S
   x0verhead
                                            ENUMERATED {xoh6, xoh12, xoh18}
                                                                                                    OPTIONAL,
    [ [
    maxMIMO-Layers
                                            INTEGER (1..4)
                                                                                                    OPTIONAL, -- Need M
                                                                                                                -- Need M
    processingType2Enabled
                                            BOOLEAN
                                                                                                    OPTIONAL
    ]],
    ] ]
    maxMIMO-LayersDCI-0-2-r16
                                            SetupRelease { MaxMIMO-LayersDCI-0-2-r16}
                                                                                                    OPTIONAL
                                                                                                                -- Need M
    ]],
    [ [
    nrofHARQ-ProcessesForPUSCH-r17
                                            ENUMERATED {n32}
                                                                                               OPTIONAL, -- Need R
    uplinkHARO-mode-r17
                                            SetupRelease { UplinkHARQ-mode-r17}
                                                                                                    OPTIONAL -- Need M
    ]]
PUSCH-CodeBlockGroupTransmission ::=
    maxCodeBlockGroupsPerTransportBlock
                                            ENUMERATED {n2, n4, n6, n8},
MaxMIMO-LayersDCI-0-2-r16 ::=
                                        INTEGER (1..4)
UplinkHARQ-mode-r17 ::=
                                       BIT STRING (SIZE (32))
-- TAG-PUSCH-SERVINGCELLCONFIG-STOP
-- ASN1STOP
```

PUSCH-CodeBlockGroupTransmission field descriptions

maxCodeBlockGroupsPerTransportBlock

Maximum number of code-block-groups (CBGs) per TB (see TS 38.213 [13], clause 9.1).

PUSCH-ServingCellConfig field descriptions

codeBlockGroupTransmission

Enables and configures code-block-group (CBG) based transmission (see TS 38.214 [19], clause 5.1.5).

The network does not configure this field if the SCS is 480 or 960 kHz.

maxMIMO-Layers

Indicates the maximum MIMO layer to be used for PUSCH in all BWPs of the corresponding UL of this serving cell (see TS 38.212 [17], clause 5.4.2.1). If present, the network sets *maxRank* to the same value. The field *maxMIMO-Layers* refers to DCI format 0_1.

nrofHARQ-ProcessesForPUSCH

The number of HARQ processes to be used on the PUSCH of a serving cell. Value *n32* corresponds to 32 HARQ processes. If the field is absent, the UE uses 16 HARQ processes (see TS 38.214 [19], clause 6.1).

processingType2Enabled

Enables configuration of advanced processing time capability 2 for PUSCH (see 38.214 [19], clause 6.4).

rateMatching

Enables LBRM (Limited buffer rate-matching). When the field is absent the UE applies FBRM (Full buffer rate-matchingLBRM) (see TS 38.212 [17], clause 5.4.2).

xOverhead

If the field is absent, the UE applies the value 'xoh0' (see TS 38.214 [19], clause 5.1.3.2).

maxMIMO-LaversDCI-0-2

Indicates the maximum MIMO layer to be used for PUSCH for DCI format 0_2 in all BWPs of the corresponding UL of this serving cell (see TS 38.212 [17], clause 5.4.2.1). If present, the network sets maxRankDCI-0-2 to the same value.

uplinkHARQ-mode

Used to set the HARQ mode per HARQ process ID, see TS 38.321 [3]. The first/leftmost bit corresponds to HARQ process ID 0, the next bit to HARQ process ID 1 and so on. Bits corresponding to HARQ process IDs that are not configured shall be ignored. A bit set to one identifies a HARQ process with *HARQ modeA* and a bit set to zero identifies a HARQ process with *HARQ modeB*. This field applies for SRBs and DRBs.

PUSCH-TimeDomainResourceAllocationList

The IE *PUSCH-TimeDomainResourceAllocation* is used to configure a time domain relation between PDCCH and PUSCH. *PUSCH-TimeDomainResourceAllocationList* contains one or more of such *PUSCH-TimeDomainResourceAllocations*. The network indicates in the UL grant which of the configured time domain allocations the UE shall apply for that UL grant. The UE determines the bit width of the DCI field based on the number of entries in the *PUSCH-TimeDomainResourceAllocationList*. Value 0 in the DCI field refers to the first element in this list, value 1 in the DCI field refers to the second element in this list, and so on.

PUSCH-TimeDomainResourceAllocation information element

```
ENUMERATED {typeA, typeB},
    mappingType
    startSymbolAndLength
                                           INTEGER (0..127)
PUSCH-TimeDomainResourceAllocationList-r16 ::= SEQUENCE (SIZE(1..maxNrofUL-Allocations-r16)) OF PUSCH-TimeDomainResourceAllocation-r16
PUSCH-TimeDomainResourceAllocation-r16 ::= SEQUENCE {
   k2-r16
                                                                     OPTIONAL, -- Need S
   puschAllocationList-r16
                                              SEQUENCE (SIZE(1..maxNrofMultiplePUSCHs-r16)) OF PUSCH-Allocation-r16,
PUSCH-Allocation-r16 ::= SEQUENCE {
    mappingType-r16
                                             ENUMERATED {typeA, typeB}
                                                                                          OPTIONAL, -- Cond NotFormat01-02-Or-TypeA
    startSymbolAndLength-r16
                                             INTEGER (0..127)
                                                                                          OPTIONAL, -- Cond NotFormat01-02-Or-TypeA
    startSymbol-r16
                                             INTEGER (0..13)
                                                                                          OPTIONAL, -- Cond RepTypeB
                                                                                          OPTIONAL, -- Cond RepTypeB
    length-r16
                                             INTEGER (1..14)
    numberOfRepetitions-r16
                                             ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16} OPTIONAL, -- Cond Format01-02
    . . . ,
    ] ]
    numberOfRepetitionsExt-r17
                                             ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16, n20, n24, n28, n32, spare4, spare3, spare2,
                                                                                          OPTIONAL, -- Cond Format01-02-For-TypeA
    numberOfSlotsTBoMS-r17
                                            ENUMERATED {n1, n2, n4, n8, spare4, spare3, spare2, spare1} OPTIONAL, -- Need R
                                             INTEGER (0..128)
                                                                                          OPTIONAL -- Cond Multipusch
    extendedK2-r17
    11
-- TAG-PUSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-STOP
-- ASN1STOP
```

PUSCH-TimeDomainResourceAllocationList field descriptions

extendedK2

Corresponds to L1 parameter 'K2' (see TS 38.214 [19], clause 6.1.2.1) configurable per PUSCH allocation. Only values {0..32} are applicable for PUSCH SCS of 120 kHz. When the field is absent for the first PUSCH if multiple PUSCH are configured per PDCCH, or when the field is absent and only one PUSCH is configured per PDCCH, the UE applies the value 1 when PUSCH SCS is 15/30 kHz; the value 2 when PUSCH SCS is 60 kHz, the value 3 when PUSCH SCS is 120 kHz, the value 11 when PUSCH SCS is 480 kHz, and the value 21 when PUSCH SCS is 960 kHz.

k2

Corresponds to L1 parameter 'K2' (see TS 38.214 [19], clause 6.1.2.1). When the field is absent the UE applies the value 1 when PUSCH SCS is 15/30 kHz; the value 2 when PUSCH SCS is 60 kHz, and the value 3 when PUSCH SCS is 120 kHz. k2 is absent/ignored if *extendedK*2 is present.

length

Indicates the length allocated for PUSCH for DCI format 0_1/0_2 (see TS 38.214 [19], clause 6.1.2.1).

mappingType

Mapping type (see TS 38.214 [19], clause 6.1.2.1).

numberOfRepetitions

Number of repetitions for DCI format 0_1/0_2 (see TS 38.214 [19], clause 6.1.2.1). When *numberOfSlotsTBoMS-r17* is set to 2, 4 or 8 (i.e. TB processing over multi-slot (TBoMS) PUSCH is enabled), it indicates the number of repetitions of a single TBoMS.

numberOfRepetitionsExt

Number of repetitions for DCI format 0_1/0_2 if pusch-RepTypeIndicatorDCI-0-1/pusch-RepTypeIndicatorDCI-0-2 is not set to pusch-RepTypeB (see TS 38.214 [19], clause 6.1.2.1). If this field is present, the field numberOfRepetitions-r16 is ignored for PUSCH repetition Type A.

numberOfSlotsTBoMS

Number of slots allocated for TB processing over multi-slot PUSCH for DCI format $0_1/0_2$. If a number of repetitions K is configured by *numberOfRepetitions* or *numberOfRepetitionsExt*, the network configures *numberOfSlotsTBoMS* (N) and K such that N*K \leq 32 (see TS 38.214 [19], clause 6.1.2.1).

puschAllocationList

The field *puschAllocationList-r16* indicates one or multiple PUSCH continuous in time domain which share a common k2 (see TS 38.214 [19], clause 6.1.2.1). The field *puschAllocationList-r17* configures one or multiple PUSCH that may be in consecutive or non-consecutive slots (see TS 38.214 [19], clause 6.1.2.1). The *puschAllocationList-r16* only has one element in *pusch-TimeDomainAllocationListDCI-0-1-r16* and in *pusch-TimeDomainAllocationListDCI-0-2-r16*.

startSymbol

Indicates the index of start symbol for PUSCH for DCI format 0_1/0_2 (see TS 38.214 [19], clause 6.1.2.1).

startSymbolAndLength

An index giving valid combinations of start symbol and length (jointly encoded) as start and length indicator (SLIV). The network configures the field so that the allocation does not cross the slot boundary. (see TS 38.214 [19], clause 6.1.2.1).

Conditional Presence	Explanation
Format01-02	In pusch-TimeDomainAllocationListForMultiPUSCH-r16, the field is absent.
	In pusch-TimeDomainAllocationListDCI-0-1 and in pusch-TimeDomainAllocationListDCI-0-2, the field is mandatory present.
Format01-02-For-TypeA	In pusch-TimeDomainAllocationListForMultiPUSCH-r16, the field is absent.
	In pusch-TimeDomainAllocationListDCI-0-1, the field is optionally present if pusch-RepTypeIndicatorDCI-0-1 is not set to
	pusch-RepTypeB, Need R. It is absent otherwise, Need R.
	In pusch-TimeDomainAllocationListDCI-0-2, the field is optionally present if pusch-RepTypeIndicatorDCI-0-2 is not set to
	pusch-RepTypeB, Need R. It is absent otherwise, Need R.
NotFormat01-02-Or-TypeA	In pusch-TimeDomainAllocationListForMultiPUSCH-r16, the field is mandatory present.
	In pusch-TimeDomainAllocationListDCI-0-1, the field is mandatory present if pusch-RepTypeIndicatorDCI-0-1 is not set to
	pusch-RepTypeB. It is absent otherwise, Need R.
	In pusch-TimeDomainAllocationListDCl-0-2, the field is mandatory present if pusch-RepTypeIndicatorDCl-0-2 is not set to
	pusch-RepTypeB. It is absent otherwise, Need R.
<i>RepTypeB</i>	In pusch-TimeDomainAllocationListForMultiPUSCH-r16, the field is absent.
	In pusch-TimeDomainAllocationListDCI-0-1, the field is mandatory present if pusch-RepTypeIndicatorDCI-0-1 is set to
	pusch-RepTypeB. It is absent otherwise, Need R.
	In pusch-TimeDomainAllocationListDCl-0-2, the field is mandatory present if pusch-RepTypeIndicatorDCl-0-2 is set to
	pusch-RepTypeB. It is absent otherwise, Need R.
MultiPUSCH	In case size of puschAllocationList is higher than 1, the field extendedK2(n) corresponding to k2 of the n-th PUSCH, n>1, is
	mandatory present. Otherwise, it is optionally present, Need S.

PUSCH-TPC-CommandConfig

The IE *PUSCH-TPC-CommandConfig* is used to configure the UE for extracting TPC commands for PUSCH from a group-TPC messages on DCI.

PUSCH-TPC-CommandConfig information element

PUSCH-TPC-CommandConfig field descriptions

targetCell

The serving cell to which the acquired power control commands are applicable. If the value is absent, the UE applies the TPC commands to the serving cell on which the command has been received.

tpc-Index

An index determining the position of the first bit of TPC command inside the DCI format 2-2 payload.

tpc-IndexSUL

An index determining the position of the first bit of TPC command inside the DCI format 2-2 payload.

Conditional Presence	Explanation
SUL-Only	The field is optionally present, Need R, if supplementaryUplink is configured within ServingCellConfig. It is absent otherwise.
SUL	The field is optionally present, Need R, if supplementaryUplink is configured within ServingCellConfig. It is mandatory
	present otherwise.

Q-OffsetRange

The IE *Q-OffsetRange* is used to indicate a cell, beam or measurement object specific offset to be applied when evaluating candidates for cell re-selection or when evaluating triggering conditions for measurement reporting. The value is in dB. Value *dB-24* corresponds to -24 dB, *dB-22* corresponds to -22 dB and so on.

Q-OffsetRange information element

– Q-QualMin

The IE *Q-QualMin* is used to indicate for cell selection/re-selection the required minimum received RSRQ level in the (NR) cell. Corresponds to parameter $Q_{qualmin}$ in TS 38.304 [20]. Actual value $Q_{qualmin}$ = field value [dB].

Q-QualMin information element

```
-- ASN1START
-- TAG-Q-QUALMIN-START
```

```
Q-QualMin ::= INTEGER (-43..-12)

-- TAG-Q-QUALMIN-STOP

-- ASN1STOP
```

– Q-RxLevMin

The IE *Q-RxLevMin* is used to indicate for cell selection/ re-selection the required minimum received RSRP level in the (NR) cell. Corresponds to parameter Q_{rxlevmin} in TS 38.304 [20]. Actual value Q_{rxlevmin} = field value * 2 [dBm].

Q-RxLevMin information element

```
-- ASN1START
-- TAG-Q-RXLEVMIN-START

Q-RXLEVMIN ::= INTEGER (-70..-22)

-- TAG-Q-RXLEVMIN-STOP
-- ASN1STOP
```

QuantityConfig

The IE QuantityConfig specifies the measurement quantities and layer 3 filtering coefficients for NR and inter-RAT measurements.

QuantityConfig information element

```
-- ASN1START
-- TAG-QUANTITYCONFIG-START
QuantityConfig ::=
                                   SEQUENCE {
    quantityConfigNR-List
                                       SEQUENCE (SIZE (1..maxNrofQuantityConfig)) OF QuantityConfigNR
                                                                                                               OPTIONAL,
                                                                                                                         -- Need M
    ] ]
    quantityConfigEUTRA
                                       FilterConfig
                                                                                                               OPTIONAL
                                                                                                                           -- Need M
    ]],
    [ [
    quantityConfigUTRA-FDD-r16
                                       QuantityConfigUTRA-FDD-r16
                                                                                                               OPTIONAL,
                                                                                                                          -- Need M
    quantityConfigCLI-r16
                                       FilterConfigCLI-r16
                                                                                                               OPTIONAL
                                                                                                                          -- Need M
    ]]
QuantityConfigNR::=
                                   SEQUENCE {
    quantityConfigCell
                                       QuantityConfigRS,
    quantityConfigRS-Index
                                       QuantityConfigRS
                                                                                                               OPTIONAL -- Need M
```

```
OuantityConfigRS ::=
                                    SEOUENCE {
    ssb-FilterConfig
                                        FilterConfig.
                                        FilterConfig
    csi-RS-FilterConfig
FilterConfig ::=
                                    SEQUENCE {
    filterCoefficientRSRP
                                        FilterCoefficient
                                                                                                 DEFAULT fc4,
    filterCoefficientRSRO
                                        FilterCoefficient
                                                                                                 DEFAULT fc4,
    filterCoefficientRS-SINR
                                        FilterCoefficient
                                                                                                 DEFAULT fc4
FilterConfigCLI-r16 ::=
                                    SEQUENCE {
    filterCoefficientSRS-RSRP-r16
                                        FilterCoefficient
                                                                                                 DEFAULT fc4,
    filterCoefficientCLI-RSSI-r16
                                        FilterCoefficient
                                                                                                 DEFAULT fc4
OuantityConfigUTRA-FDD-r16 ::=
    filterCoefficientRSCP-r16
                                        FilterCoefficient
                                                                                                 DEFAULT fc4,
    filterCoefficientEcNO-r16
                                        FilterCoefficient
                                                                                                 DEFAULT fc4
-- TAG-QUANTITYCONFIG-STOP
```

QuantityConfigNR field descriptions

quantityConfigCell

-- ASN1STOP

Specifies L3 filter configurations for cell measurement results for the configurable RS Types (e.g. SS/PBCH block and CSI-RS) and the configurable measurement quantities (e.g. RSRP, RSRQ and SINR).

quantityConfigRS-Index

Specifies L3 filter configurations for measurement results per RS index for the configurable RS Types (e.g. SS/PBCH block and CSI-RS) and the configurable measurement quantities (e.g. RSRP, RSRQ and SINR).

QuantityConfigRS field descriptions

csi-RS-FilterConfig

CSI-RS based L3 filter configurations:

Specifies L3 filter configurations for CSI-RSRP, CSI-RSRQ and CSI-SINR measurement results from the L1 filter(s), as defined in TS 38.215 [9].

ssb-FilterConfig

SS Block based L3 filter configurations:

Specifies L3 filter configurations for SS-RSRP, SS-RSRQ and SS-SINR measurement results from the L1 filter(s), as defined in TS 38.215 [9].

QuantityConfigUTRA-FDD field descriptions

filterCoefficientRSCP

Specifies L3 filter coefficient for FDD UTRAN CPICH_RSCP measuement results from L1 filter.

filterCoefficientEcN0

Specifies L3 filter coefficient for FDD UTRAN CPICH_EcN0 measuement results from L1 filter.

RACH-ConfigCommon

The IE RACH-ConfigCommon is used to specify the cell specific random-access parameters.

RACH-ConfigCommon information element

```
-- ASN1START
-- TAG-RACH-CONFIGCOMMON-START
RACH-ConfigCommon ::=
                                     SEOUENCE {
    rach-ConfigGeneric
                                         RACH-ConfigGeneric,
    totalNumberOfRA-Preambles
                                         INTEGER (1..63)
                                                                                                               OPTIONAL. -- Need S
    ssb-perRACH-OccasionAndCB-PreamblesPerSSB CHOICE {
        oneEighth
                                                     ENUMERATED {n4, n8, n12, n16, n20, n24, n28, n32, n36, n40, n44, n48, n52, n56, n60, n64},
        oneFourth
                                                     ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
        oneHalf
                                                     ENUMERATED {n4, n8, n12, n16, n20, n24, n28, n32, n36, n40, n44, n48, n52, n56, n60, n64},
        one
                                                     ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
        two
                                                     ENUMERATED {n4, n8, n12, n16, n20, n24, n28, n32},
        four
                                                     INTEGER (1..16),
                                                     INTEGER (1..8),
        eight
                                                     INTEGER (1..4)
        sixteen
                                                                                                               OPTIONAL. -- Need M
    groupBconfigured
                                         SEOUENCE {
        ra-Msg3SizeGroupA
                                             ENUMERATED {b56, b144, b208, b256, b282, b480, b640,
                                                         b800, b1000, b72, spare6, spare5, spare4, spare3, spare2, spare1,
        messagePowerOffsetGroupB
                                             ENUMERATED { minusinfinity, dB0, dB5, dB8, dB10, dB12, dB15, dB18},
        numberOfRA-PreamblesGroupA
                                             INTEGER (1..64)
                                                                                                               OPTIONAL,
                                                                                                                           -- Need R
    ra-ContentionResolutionTimer
                                             ENUMERATED { sf8, sf16, sf24, sf32, sf40, sf48, sf56, sf64},
    rsrp-ThresholdSSB
                                             RSRP-Range
                                                                                                               OPTIONAL,
                                                                                                                           -- Need R
    rsrp-ThresholdSSB-SUL
                                             RSRP-Range
                                                                                                               OPTIONAL,
                                                                                                                           -- Cond SUL
    prach-RootSequenceIndex
                                             CHOICE {
        1839
                                                 INTEGER (0..837),
        1139
                                                 INTEGER (0..137)
    msg1-SubcarrierSpacing
                                             SubcarrierSpacing
                                                                                                               OPTIONAL,
                                                                                                                           -- Cond L139
    restrictedSetConfig
                                             ENUMERATED {unrestrictedSet, restrictedSetTypeA, restrictedSetTypeB},
    msg3-transformPrecoder
                                             ENUMERATED {enabled}
                                                                                                               OPTIONAL,
                                                                                                                           -- Need R
    ra-PrioritizationForAccessIdentity-r16 SEQUENCE {
        ra-Prioritization-r16
                                                 RA-Prioritization,
        ra-PrioritizationForAI-r16
                                                 BIT STRING (SIZE (2))
                                                                                                                         -- Cond InitialBWP-Only
                                                                                                               OPTIONAL,
    prach-RootSequenceIndex-r16
                                             CHOICE {
       1571
                                                 INTEGER (0..569),
       11151
                                                 INTEGER (0..1149)
       OPTIONAL -- Need R
    11,
    ] ]
    ra-PrioritizationForSlicing-r17
                                             RA-PrioritizationForSlicing-r17
                                                                                                        OPTIONAL, -- Cond InitialBWP-Only
```

```
featureCombinationPreamblesList-r17
OPTIONAL -- Cond AdditionalRACH
     ]]
}
-- TAG-RACH-CONFIGCOMMON-STOP
-- ASN1STOP
```

SEQUENCE (SIZE(1..maxFeatureCombPreamblesPerRACHResource-r17)) OF FeatureCombinationPreambles-r17

RACH-ConfigCommon field descriptions

featureCombinationPreamblesList

Specifies a series of preamble partitions each associated to a combination of features and 4-step RA. The network does not configure this list to have more than 16 entries.

messagePowerOffsetGroupB

Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on. (see TS 38.321 [3], clause 5.1.2)

msg1-SubcarrierSpacing

Subcarrier spacing of PRACH (see TS 38.211 [16], clause 5.3.2).

Only the following values are applicable depending on the used frequency:

FR1: 15 or 30 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

If absent, the UE applies the SCS as derived from the *prach-ConfigurationIndex* in *RACH-ConfigGeneric* (see tables Table 6.3.3.1-1, Table 6.3.3.1-2, Table 6.3.3.2-2 and Table 6.3.3.2-3, TS 38.211 [16]). The value also applies to contention free random access (*RACH-ConfigDedicated*), to SI-request and to contention-based beam failure recovery (CB-BFR). But it does not apply for contention free beam failure recovery (CF-BFR) (see *BeamFailureRecoveryConfig*).

msg3-transformPrecoder

Enables the transform precoder for Msg3 transmission according to clause 6.1.3 of TS 38.214 [19]. If the field is absent, the UE disables the transformer precoder (see TS 38.213 [13], clause 8.3).

numberOfRA-PreamblesGroupA

The number of CB preambles per SSB in group A. This determines implicitly the number of CB preambles per SSB available in group B. (see TS 38.321 [3], clause 5.1.1). The setting should be consistent with the setting of ssb-perRACH-OccasionAndCB-PreamblesPerSSB.

prach-RootSequenceIndex

PRACH root sequence index (see TS 38.211 [16], clause 6.3.3.1). The value range depends on whether L=839 or L=139 or L=571 or L=1151. The length of the root sequence corresponding with the index indicated in this IE should be consistent with the one indicated in *prach-ConfigurationIndex* in the *RACH-ConfigDedicated* (if configured). If *prach-RootSequenceIndex-r16* is signalled, UE shall ignore the *prach-RootSequenceIndex* (without suffix).

For FR2-2, only the following values are applicable depending on the used subcarrier spacing:

120 kHz: L=139. L=571. and L=1151

480 kHz: L=139, and L=571

960 kHz: L=139

ra-ContentionResolutionTimer

The initial value for the contention resolution timer (see TS 38.321 [3], clause 5.1.5). Value sf8 corresponds to 8 subframes, value sf16 corresponds to 16 subframes, and so on.

ra-Msg3SizeGroupA

Transport Blocks size threshold in bits below which the UE shall use a contention-based RA preamble of group A. (see TS 38.321 [3], clause 5.1.2).

ra-Prioritization

Parameters which apply for prioritized random access procedure on any UL BWP of SpCell for specific Access Identities (see TS 38.321 [3], clause 5.1.1a).

ra-PrioritizationForAl

Indicates whether the field *ra-Prioritization-r16* applies for Access Identities. The first/leftmost bit corresponds to Access Identity 1, the next bit corresponds to Access Identity 2. Value 1 indicates that the field *ra-Prioritization-r16* applies otherwise the field does not apply (see TS 23.501 [32]).

ra-PrioritizationForSlicing

Parameters which apply to configure prioritized CBRA 4-step random access type for slicing.

rach-ConfigGeneric

RACH parameters for both regular random access and beam failure recovery.

restrictedSetConfia

Configuration of an unrestricted set or one of two types of restricted sets, see TS 38.211 [16], clause 6.3.3.1.

rsrp-ThresholdSSB

UE may select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy the threshold (see TS 38.213 [13]).

rsrp-ThresholdSSB-SUL

The UE selects SUL carrier to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). The value applies to all the BWPs and all RACH configurations.

ssb-perRACH-OccasionAndCB-PreamblesPerSSB

The meaning of this field is twofold: the CHOICE conveys the information about the number of SSBs per RACH occasion. Value *oneEighth* corresponds to one SSB associated with 8 RACH occasions, value *oneFourth* corresponds to one SSB associated with 4 RACH occasions, and so on. The ENUMERATED part indicates the number of Contention Based preambles per SSB. Value *n4* corresponds to 4 Contention Based preambles per SSB, value *n8* corresponds to 8 Contention Based preambles per SSB, and so on. The total number of CB preambles in a RACH occasion is given by *CB-preambles-per-SSB** max(1, *SSB-per-rach-occasion*). See TS 38.213 [13].

totalNumberOfRA-Preambles

Total number of preambles used for contention based and contention free 4-step or 2-step random access in the RACH resources defined in *RACH-ConfigCommon*, excluding preambles used for other purposes (e.g. for SI request). If the field is absent, all 64 preambles are available for RA. The setting should be consistent with the setting of *ssb-perRACH-OccasionAndCB-PreamblesPerSSB*, i.e. it should be a multiple of the number of SSBs per RACH occasion.

Conditional Presence	Explanation
AdditionalRACH	The field is mandatory present if the RACH-ConfigCommon is included in an AdditionalRACH-Config. When included in initialUplinkBWP-RedCap to indicate other feature(s) than redcap, this field is mandatory present with at least two FeatureCombinationPreambles list entries: one list entry indicating only redcap and the other(s) indicating both redcap and
	one or multiple other feature(s) (e.g. smallData, nsag or msg3-Repetitions). Otherwise, it is optional, Need R.
InitialBWP-Only	This field is optionally present, Need R, if this BWP is the initial BWP of SpCell. Otherwise, the field is absent.
L139	The field is mandatory present if <i>prach-RootSequenceIndex</i> L=139, otherwise the field is absent, Need S.
SUL	The field is mandatory present in rach-ConfigCommon in initialUplinkBWP if supplementaryUplink is configured in ServingCellConfigCommonSIB or if supplementaryUplinkConfig is configured in ServingCellConfigCommon; otherwise, the field is absent. This field is not configured in additionalRACH-Config.

RACH-ConfigCommonTwoStepRA

The IE RACH-ConfigCommonTwoStepRA is used to specify cell specific 2-step random-access type parameters.

RACH-ConfigCommonTwoStepRA information element

```
-- ASN1START
-- TAG-RACH-CONFIGCOMMONTWOSTEPRA-START
RACH-ConfigCommonTwoStepRA-r16 ::=
                                                        SEOUENCE {
    rach-ConfigGenericTwoStepRA-r16
                                                             RACH-ConfigGenericTwoStepRA-r16,
    msqA-TotalNumberOfRA-Preambles-r16
                                                             INTEGER (1..63)
                                                                                                                    OPTIONAL, -- Need S
    msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB-r16
                                                             CHOICE {
        oneEighth
                                                                 ENUMERATED {n4, n8, n12, n16, n20, n24, n28, n32, n36, n40, n44, n48, n52, n56, n60, n64},
        oneFourth
                                                                 ENUMERATED {n4.n8.n12.n16.n20.n24.n28.n32.n36.n40.n44.n48.n52.n56.n60.n64}.
        oneHalf
                                                                 ENUMERATED {n4, n8, n12, n16, n20, n24, n28, n32, n36, n40, n44, n48, n52, n56, n60, n64},
                                                                 ENUMERATED {n4, n8, n12, n16, n20, n24, n28, n32, n36, n40, n44, n48, n52, n56, n60, n64},
        one
```

```
ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32},
        t.wo
        four
                                                             INTEGER (1..16),
        eight.
                                                             INTEGER (1..8).
        sixteen
                                                             INTEGER (1..4)
                                                                                                                         OPTIONAL, -- Cond 2StepOnly
                                                         INTEGER (1..60)
                                                                                                                         OPTIONAL, -- Cond SharedRO
    msgA-CB-PreamblesPerSSB-PerSharedRO-r16
    msqA-SSB-SharedRO-MaskIndex-r16
                                                         INTEGER (1..15)
                                                                                                                         OPTIONAL, -- Need S
                                                                                                                         OPTIONAL, -- Need S
    groupB-ConfiguredTwoStepRA-r16
                                                         GroupB-ConfiguredTwoStepRA-r16
    msgA-PRACH-RootSequenceIndex-r16
                                                         CHOICE {
       1839
                                                             INTEGER (0..837),
       1139
                                                             INTEGER (0..137),
       1571
                                                             INTEGER (0..569),
       11151
                                                             INTEGER (0..1149)
                                                                                                                         OPTIONAL, -- Cond 2StepOnly
    msqA-TransMax-r16
                                                         ENUMERATED {n1, n2, n4, n6, n8, n10, n20, n50, n100, n200}
                                                                                                                         OPTIONAL, -- Need R
    msqA-RSRP-Threshold-r16
                                                         RSRP-Range
                                                                                                                         OPTIONAL, -- Cond
2Step4Step
                                                                                                                         OPTIONAL, -- Need R
    msgA-RSRP-ThresholdSSB-r16
                                                         RSRP-Range
                                                                                                                         OPTIONAL, -- Cond
    msqA-SubcarrierSpacing-r16
                                                         SubcarrierSpacing
2StepOnlvL139
    msgA-RestrictedSetConfig-r16
                                                         ENUMERATED {unrestrictedSet, restrictedSetTypeA,
                                                                     restrictedSetTypeB}
                                                                                                                         OPTIONAL, -- Cond 2StepOnly
    ra-PrioritizationForAccessIdentityTwoStep-r16
                                                         SEOUENCE {
       ra-Prioritization-r16
                                                             RA-Prioritization,
       ra-PrioritizationForAI-r16
                                                             BIT STRING (SIZE (2))
                                                                                                                         OPTIONAL, -- Cond
InitialBWP-Only
    ra-ContentionResolutionTimer-r16
                                                         ENUMERATED {sf8, sf16, sf24, sf32, sf40, sf48, sf56, sf64}
                                                                                                                         OPTIONAL, -- Cond 2StepOnly
    [ [
                                                                                                       OPTIONAL, -- Cond InitialBWP-Only
    ra-PrioritizationForSlicingTwoStep-r17
                                                         RA-PrioritizationForSlicing-r17
    featureCombinationPreamblesList-r17 SEQUENCE (SIZE(1..maxFeatureCombPreamblesPerRACHResource-r17)) OF FeatureCombinationPreambles-r17 OPTIONAL
-- Cond AdditionalRACH
    ]]
GroupB-ConfiguredTwoStepRA-r16 ::=
                                                         SEOUENCE {
                                                         ENUMERATED {b56, b144, b208, b256, b282, b480, b640, b800,
    ra-MsqA-SizeGroupA
                                                                     b1000, b72, spare6, spare5, spare4, spare3, spare2, spare1},
    messagePowerOffsetGroupB
                                                         ENUMERATED {minusinfinity, dB0, dB5, dB8, dB10, dB12, dB15, dB18},
                                                         INTEGER (1..64)
    numberOfRA-PreamblesGroupA
-- TAG-RACH-CONFIGCOMMONTWOSTEPRA-STOP
-- ASN1STOP
```

RACH-ConfigCommonTwoStepRA field descriptions

featureCombinationPreamblesList

Specifies a series of preamble partitions each associated to a combination of features and 2-step RA. The network does not configure this list to have more than 16 entries.

groupB-ConfiguredTwoStepRA

Preamble grouping for 2-step random access type. If the field is absent then there is only one preamble group configured and only one msgA PUSCH configuration.

msgA-CB-PreamblesPerSSB-PerSharedRO

Number of contention-based preambles used for 2-step RA type from the non-CBRA 4-step type preambles associated with each SSB for RO shared with 4-step type RA. The number of preambles for 2-step RA type shall not exceed the number of preambles per SSB minus the number of contention-based preambles per SSB for 4-step type RA. The possible value range for this parameter needs to be aligned with value range for the configured SSBs per RACH occasion in *ssb-perRACH-OccasionAndCB-PreamblesPerSSB* in *RACH-ConfigCommon*. The field is only applicable for the case of shared ROs with 4-step type random access.

msgA-PRACH-RootSequenceIndex

PRACH root sequence index. If the field is not configured in RACH-ConfigCommonTwoStepRA which is configured directly within a BWP (i.e., not within AdditionalRACH-Config), the UE applies the value in field prach-RootSequenceIndex in RACH-ConfigCommon in the configured BWP. If the field is absent in RACH-ConfigCommonTwoStepRA in AdditionalRACH-Config, the UE applies the corresponding value of prach-RootSequenceIndex in RACH-ConfigCommon in the same AdditionalRACH-Config. When both 2-step and 4-step type random access is configured, this field is only configured for the case of separate ROs between 2-step and 4-step type random access.

For FR2-2, only the following values are applicable depending on the used subcarrier spacing:

120 kHz: L=139, L=571, and L=1151

480 kHz: L=139, and L=571

960 kHz: L=139

msgA-RestrictedSetConfig

Configuration of an unrestricted set or one of two types of restricted sets for 2-step random access type preamble. If the field is not configured in RACH-ConfigCommonTwoStepRA which is configured directly within a BWP (i.e. not within AdditionalRACH-Config), the UE applies the value in field restrictedSetConfig in RACH-ConfigCommon in the configured BWP. If the field is absent in RACH-ConfigCommonTwoStepRA in AdditionalRACH-Config, the UE applies the value of restrictedSetConfig in RACH-ConfigCommon in the same AdditionalRACH-Config. When both 2-step and 4-step type random access is configured, this field is only configured for the case of separate ROs between 2-step and 4-step type random access.

msgA-RSRP-Threshold

The UE selects 2-step random access type to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). This field is only present if both 2-step and 4-step RA type are configured for the BWP.

msgA-RSRP-ThresholdSSB

UE may select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy the threshold (see TS 38.213 [13]).

msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB

The meaning of this field is twofold: the CHOICE conveys the information about the number of SSBs per RACH occasion. Value *oneEight* corresponds to one SSB associated with 8 RACH occasions, value *oneFourth* corresponds to one SSB associated with 4 RACH occasions, and so on. The ENUMERATED part indicates the number of Contention Based preambles per SSB. Value *n4* corresponds to 4 Contention Based preambles per SSB, value *n8* corresponds to 8 Contention Based preambles per SSB, and so on. The total number of CB preambles in a RACH occasion is given by *CB-preambles-per-SSB** max(1, *SSB-per-rach-occasion*). If the field is not configured in *RACH-ConfigCommonTwoStepRA* which is configured directly within a BWP (i.e. not within *AdditionalRACH-Config*) and both 2-step and 4-step are configured in *AdditionalRACH-Config* and both 2-step and 4-step are configured in *AdditionalRACH-Config*, the UE applies the value in the field ssb-perRACH-OccasionAndCB-PreamblesPerSSB in *RACH-ConfigCommon* in the same *AdditionalRACH-Config*. The field is not present when RACH occasions are shared between 2-step and 4-step type random access in the BWP.

msgA-SSB-SharedRO-MaskIndex

Indicates the subset of 4-step type ROs shared with 2-step random access type for each SSB. This field is configured when there is more than one RO per SSB. If the field is absent, and 4-step and 2-step has shared ROs, then all ROs are shared.

msgA-SubcarrierSpacing

Subcarrier spacing of PRACH (see TS 38.211 [16], clause 5.3.2).

Only the following values are applicable depending on the used frequency:

FR1: 15 or 30 kHz FR2-1: 60 or 120 kHz

FR2-2: 120, 480, or 960 kHz.

If the field is absent, the UE applies the SCS as derived from the *msgA-PRACH-ConfigurationIndex* in *RACH-ConfigGenericTwoStepRA* (see tables Table 6.3.3.1-1, Table 6.3.3.1-2, Table 6.3.3.2-2 and Table 6.3.3.2-3, TS 38.211 [16]) in case of 2-step only BWP, otherwise the UE applies the same SCS as Msg1 derived from *RACH-ConfigCommon*. The value also applies to contention free 2-step random access type (*RACH-ConfigDedicated*).

msgA-TotalNumberOfRA-Preambles

Indicates the total number of preambles used for contention-based and contention-free 2-step random access type when ROs for 2-step are not shared with 4-step. If the field is absent, and 2-step and 4-step does not have shared ROs, all 64 preambles are available for 2-step random access type.

msgA-TransMax

Max number of MsgA preamble transmissions performed before switching to 4-step random access (see TS 38.321 [3], clauses 5.1.1). This field is only applicable when 2-step and 4-step RA type are configured and switching to 4-step type RA is supported. If the field is absent, switching from 2-step RA type to 4-step RA type is not allowed.

ra-ContentionResolutionTimer

The initial value for the contention resolution timer for fallback RAR in case no 4-step random access type is configured (see TS 38.321 [3], clause 5.1.5). Value sf8 corresponds to 8 subframes, value sf16 corresponds to 16 subframes, and so on. If both 2-step and 4-step random access type resources are configured on the BWP, then this field is absent. If the field is absent in RACH-ConfigCommonTwoStepRA in AdditionalRACH-Config, the UE shall apply the corresponding value in RACH-ConfigCommon in the same AdditionalRACH-Config.

ra-Prioritization

Parameters which apply for prioritized random access procedure on any UL BWP of SpCell for specific Access Identities (see TS 38.321 [3], clause 5.1.1a).

ra-PrioritizationForAl

Indicates whether the field *ra-Prioritization-r16* applies for Access Identities. The first/leftmost bit corresponds to Access Identity 1, the next bit corresponds to Access Identity 2. Value 1 for an Access Identity indicates that the field *ra-Prioritization-r16* applies, otherwise the field does not apply.

ra-PrioritizationForSlicingTwoStep

Parameters which apply to configure prioritized CBRA 2-step random access type for slicing.

rach-ConfigGenericTwoStepRA

2-step random access type parameters for both regular random access and beam failure recovery.

GroupB-ConfiguredTwoStepRA field descriptions

messagePowerOffsetGroupB

Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on. (see TS 38.321 [3], clause 5.1.1).

numberOfRA-PreamblesGroupA

The number of CB preambles per SSB in group A for idle/inactive or connected mode. The setting of the number of preambles for each group should be consistent with msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB or msgA-CB-PreamblesPerSSB-PerSharedRO if configured.

ra-MsgA-SizeGroupA

Transport block size threshold in bits below which the UE shall use a contention-based RA preamble of group A. (see TS 38.321 [3], clause 5.1.1).

Conditional Presence	Explanation
2Step4Step	The field is mandatory present if both 2-step random access type and 4-step random access type are configured in the BWP, otherwise the field is not present.
	The field is mandatory present in <i>msgA-ConfigCommon</i> field in <i>AdditionalRACH-Config</i> if both 2-step random access type and 4-step random access type are configured for the same feature combination in the BWP.
2StepOnlyL139	The field is mandatory present if <i>msgA-PRACH-RootSequenceIndex</i> L=139 and no 4-step random access type is configured, otherwise the field is absent, Need S.
2StepOnly	The field is mandatory present in <i>msgA-ConfigCommon</i> field in BWP-UplinkCommon if rach-ConfigCommon field is absent in this BWP-UplinkCommon, otherwise the field is optionally present in <i>msgA-ConfigCommon</i> field in BWP-UplinkCommon, Need S. The field is mandatory present in <i>msgA-ConfigCommon</i> field in <i>AdditionalRACH-Config</i> if rach-ConfigCommon field is absent in this <i>AdditionalRACH-Config</i> , otherwise the field is optionally present in <i>msgA-ConfigCommon</i> field in <i>AdditionalRACH-Config</i> , Need S.
AdditionalRACH	The field is mandatory present if the RACH-ConfigCommon is included in an AdditionalRACH-Config. When included in initialUplinkBWP-RedCap to indicate other feature(s) than redcap, this field is mandatory present with at least two FeatureCombinationPreambles list entries: one list entry indicating only redcap and the other(s) indicating both redcap and one or multiple other feature(s) (e.g. smallData, nsag or msg3-Repetitions). Otherwise, it is optional, Need R.
InitialBWP-Only	This field is optionally present, Need R, if this BWP is the initial BWP of SpCell. Otherwise, the field is absent.
SharedRO	The field is mandatory present if the 2-step random access type occasions are shared with 4-step random access type, otherwise the field is not present.

RACH-ConfigDedicated

The IE RACH-ConfigDedicated is used to specify the dedicated random access parameters.

RACH-ConfigDedicated information element

```
-- ASN1START
-- TAG-RACH-CONFIGDEDICATED-START
RACH-ConfigDedicated ::=
                               SEQUENCE {
    cfra
                                   CFRA
                                                                                                           OPTIONAL, -- Need S
    ra-Prioritization
                                   RA-Prioritization
                                                                                                           OPTIONAL, -- Need N
    ra-PrioritizationTwoStep-r16
                                   RA-Prioritization
                                                                                                           OPTIONAL, -- Need N
    cfra-TwoStep-r16
                                   CFRA-TwoStep-r16
                                                                                                           OPTIONAL -- Need S
    ]]
                           SEQUENCE {
CFRA ::=
    occasions
                                   SEQUENCE {
       rach-ConfigGeneric
                                       RACH-ConfigGeneric,
       ssb-perRACH-Occasion
                                       ENUMERATED {oneEighth, oneFourth, oneHalf, one, two, four, eight, sixteen}
                                                                                                           OPTIONAL -- Cond Mandatory
                                                                                                           OPTIONAL, -- Need S
```

```
CHOICE {
    resources
       ssb
                                        SEOUENCE {
            ssb-ResourceList
                                            SEQUENCE (SIZE(1..maxRA-SSB-Resources)) OF CFRA-SSB-Resource,
           ra-ssb-OccasionMaskIndex
                                            INTEGER (0..15)
       csirs
                                        SEOUENCE {
            csirs-ResourceList
                                            SEQUENCE (SIZE(1..maxRA-CSIRS-Resources)) OF CFRA-CSIRS-Resource,
            rsrp-ThresholdCSI-RS
                                            RSRP-Range
    },
    ] ]
                                                                                                            OPTIONAL -- Cond Occasions
    totalNumberOfRA-Preambles INTEGER (1..63)
    11
CFRA-TwoStep-r16 ::=
                                        SEOUENCE {
    occasionsTwoStepRA-r16
                                            SEOUENCE
       rach-ConfigGenericTwoStepRA-r16
                                                RACH-ConfigGenericTwoStepRA-r16,
        ssb-PerRACH-OccasionTwoStepRA-r16
                                                ENUMERATED {oneEighth, oneFourth, oneHalf, one,
                                                             two, four, eight, sixteen}
                                                                                                            OPTIONAL, -- Need S
   msgA-CFRA-PUSCH-r16
                                            MsgA-PUSCH-Resource-r16,
   msgA-TransMax-r16
                                            ENUMERATED {n1, n2, n4, n6, n8, n10, n20, n50, n100, n200}
                                                                                                            OPTIONAL, -- Need S
    resourcesTwoStep-r16
                                            SEOUENCE {
        ssb-ResourceList
                                                SEQUENCE (SIZE(1..maxRA-SSB-Resources)) OF CFRA-SSB-Resource,
        ra-ssb-OccasionMaskIndex
                                                INTEGER (0..15)
CFRA-SSB-Resource ::=
                                SEQUENCE {
                                     SSB-Index,
    ra-PreambleIndex
                                    INTEGER (0..63),
   . . . ,
    ] ]
    msgA-PUSCH-Resource-Index-r16
                                    INTEGER (0..3071)
                                                           OPTIONAL -- Cond 2StepCFRA
    ]]
CFRA-CSIRS-Resource ::=
                                SEOUENCE {
    csi-RS
                                    CSI-RS-Index,
    ra-OccasionList
                                    SEQUENCE (SIZE(1..maxRA-OccasionsPerCSIRS)) OF INTEGER (0..maxRA-Occasions-1),
   ra-PreambleIndex
                                    INTEGER (0..63),
-- TAG-RACH-CONFIGDEDICATED-STOP
-- ASN1STOP
```

CFRA-CSIRS-Resource field descriptions

csi-RS

The ID of a CSI-RS resource defined in the measurement object associated with this serving cell.

ra-OccasionList

RA occasions that the UE shall use when performing CF-RA upon selecting the candidate beam identified by this CSI-RS. The network ensures that the RA occasion indexes provided herein are also configured by prach-ConfigurationIndex and msg1-FDM. Each RACH occasion is sequentially numbered, first, in increasing order of frequency resource indexes for frequency multiplexed PRACH occasions; second, in increasing order of time resource indexes for time multiplexed PRACH occasions within a PRACH slot and Third, in increasing order of indexes for PRACH slots.

ra-PreambleIndex

The RA preamble index to use in the RA occasions associated with this CSI-RS.

CFRA field descriptions

occasions

RA occasions for contention free random access. If the field is absent, the UE uses the RA occasions configured in RACH-ConfigCommon in the first active UL BWP.

ra-ssb-OccasionMaskIndex

Explicitly signalled PRACH Mask Index for RA Resource selection in TS 38.321 [3]. The mask is valid for all SSB resources signalled in ssb-ResourceList.

rach-ConfigGeneric

Configuration of contention free random access occasions for CFRA. The UE shall ignore *preambleReceivedTargetPower*, *preambleTransMax*, *powerRampingStep*, *ra-ResponseWindow* signaled within this field and use the corresponding values provided in *RACH-ConfigCommon*.

ssb-perRACH-Occasion

Number of SSBs per RACH occasion.

totalNumberOfRA-Preambles

Total number of preambles used for contention free random access in the RACH resources defined in CFRA, excluding preambles used for other purposes (e.g. for SI request). If the field is absent but the field *occasions* is present, the UE may assume all the 64 preambles are for RA. The setting should be consistent with the setting of *ssb-perRACH-Occasion*, if present, i.e. it should be a multiple of the number of SSBs per RACH occasion.

CFRA-SSB-Resource field descriptions

msgA-PUSCH-Resource-Index

Identifies the index of the PUSCH resource used for MSGA CFRA. The PUSCH resource index indicates a valid PUSCH occasion (as specified in TS 38.213 [13], clause 8.1A) and the associated DMRS resources corresponding to a PRACH slot. The PUSCH resource indexes are sequentially numbered and are mapped to valid PUSCH occasions corresponding to a PRACH slot which are ordered, first, in increasing order of frequency resource indexes for frequency multiplexed PUSCH occasions; second, in increasing order of DMRS resource indexes within a PUSCH occasion, where a DMRS resource index **DMRS**_{id} is determined first in an ascending order of a DMRS port index and then in an ascending order of a DMRS sequence index, third in increasing order of time resource indexes for time multiplexed PUSCH occasions within a PUSCH slot and fourth, in increasing order of indexes for PUSCH slots. For the case of contention free 2-step random access type, if this field is absent, the UE shall use the value 0.

ra-PreambleIndex

The preamble index that the UE shall use when performing CF-RA upon selecting the candidate beams identified by this SSB.

ssb

The ID of an SSB transmitted by this serving cell.

CFRA-TwoStep field descriptions

msgA-CFRA-PUSCH

PUSCH resource configuration(s) for msgA CFRA.

msgA-TransMax

Max number of MsgA preamble transmissions performed before switching to 4-step type random access (see TS 38.321 [3], clauses 5.1.1). This field is only applicable when 2-step and 4-step RA type are configured and switching to 4-step type RA is supported. If the field is absent in *cfra-TwoStep*, switching from 2-step RA type to 4-step RA type is not allowed.

occasionsTwoStepRA

RA occasions for contention free random access. If the field is absent, the UE uses the RA occasions configured in RACH-ConfigCommonTwoStepRA in the first active UL BWP.

ra-SSB-OccasionMaskIndex

Explicitly signalled PRACH Mask Index for RA Resource selection in TS 38.321 [3]. The mask is valid for all SSB resources signalled in ssb-ResourceList.

rach-ConfigGenericTwoStepRA

Configuration of contention free random access occasions for CFRA 2-step random access type.

ssb-PerRACH-OccasionTwoStep

Number of SSBs per RACH occasion for 2-step random access type.

RACH-ConfigDedicated field descriptions

cfra

Parameters for contention free random access to a given target cell. If this field and cfra-TwoStep are absent, the UE performs contention based random access.

cfra-TwoStep

Parameters for contention free 2-step random access type to a given target cell. Network ensures that *cfra* and *cfra-TwoStep* are not configured at the same time. If this field and *cfra* are absent, the UE performs contention based random access. This field may only be present if *msgA-ConfigCommon* is configured on the BWP.

ra-prioritization

Parameters which apply for prioritized random access procedure to a given target cell (see TS 38.321 [3], clause 5.1.1).

ra-PrioritizationTwoStep

Parameters which apply for prioritized 2-step random access type procedure to a given target cell (see TS 38.321 [3], clause 5.1.1).

Conditional Presence	Explanation
Mandatory	The field is mandatory present.
Occasions	The field is optionally present, Need S, if the field <i>occasions</i> is present, otherwise it is absent.
2StepCFRA	The field is optionally present for the case of 2-step RA type contention free random access, Need S, otherwise it is absent.

RACH-ConfigGeneric

The IE RACH-ConfigGeneric is used to specify the random-access parameters both for regular random access as well as for beam failure recovery.

RACH-ConfigGeneric information element

```
-- ASN1START
```

-- TAG-RACH-CONFIGGENERIC-START

RACH-ConfigGeneric ::=

SEQUENCE {

```
prach-ConfigurationIndex
                                        INTEGER (0..255),
   msq1-FDM
                                        ENUMERATED {one, two, four, eight},
                                        INTEGER (0..maxNrofPhysicalResourceBlocks-1),
   msq1-FrequencyStart
    zeroCorrelationZoneConfig
                                        INTEGER(0..15),
    preambleReceivedTargetPower
                                        INTEGER (-202..-60),
    preambleTransMax
                                        ENUMERATED {n3, n4, n5, n6, n7, n8, n10, n20, n50, n100, n200},
    powerRampingStep
                                        ENUMERATED {dB0, dB2, dB4, dB6},
    ra-ResponseWindow
                                        ENUMERATED {s11, s12, s14, s18, s110, s120, s140, s180},
    prach-ConfigurationPeriodScaling-IAB-r16
                                                ENUMERATED {scf1,scf2,scf4,scf8,scf16,scf32,scf64}
                                                                                                                OPTIONAL,
                                                                                                                           -- Need R
    prach-ConfigurationFrameOffset-IAB-r16
                                                INTEGER (0..63)
                                                                                                                OPTIONAL,
                                                                                                                            -- Need R
    prach-ConfigurationSOffset-IAB-r16
                                                                                                                            -- Need R
                                                INTEGER (0..39)
                                                                                                                OPTIONAL,
    ra-ResponseWindow-v1610
                                                ENUMERATED { s160, s1160}
                                                                                                                OPTIONAL,
                                                                                                                           -- Need R
    prach-ConfigurationIndex-v1610
                                                INTEGER (256..262)
                                                                                                                OPTIONAL
                                                                                                                            -- Need R
    ]],
    ] ]
    ra-ResponseWindow-v1700
                                                ENUMERATED {s1240, s1320, s1640, s1960, s11280, s11920, s12560} OPTIONAL
                                                                                                                            -- Need R
    ]]
-- TAG-RACH-CONFIGGENERIC-STOP
-- ASN1STOP
```

RACH-ConfigGeneric field descriptions

msg1-FDM

The number of PRACH transmission occasions FDMed in one time instance. (see TS 38.211 [16], clause 6.3.3.2).

msg1-FrequencyStart

Offset of lowest PRACH transmission occasion in frequency domain with respective to PRB 0. The value is configured so that the corresponding RACH resource is entirely within the bandwidth of the UL BWP. (see TS 38.211 [16], clause 6.3.3.2).

powerRampingStep

Power ramping steps for PRACH (see TS 38.321 [3],5.1.3).

prach-ConfigurationFrameOffset-IAB

Frame offset for ROs defined in the baseline configuration indicated by prach-ConfigurationIndex and is used only by the IAB-MT. (see TS 38.211 [16], clause 6.3.3.2).

prach-ConfigurationIndex

PRACH configuration index. For *prach-ConfigurationIndex* configured under *beamFailureRecoveryConfig*, the *prach-ConfigurationIndex* can only correspond to the short preamble format, (see TS 38.211 [16], clause 6.3.3.2). If the field *prach-ConfigurationIndex-v1610* is present, the UE shall ignore the value provided in *prach-ConfigurationIndex* (without suffix).

prach-ConfigurationPeriodScaling-IAB

Scaling factor to extend the periodicity of the baseline configuration indicated by *prach-ConfigurationIndex* and is used only by the IAB-MT. Value scf1 corresponds to scaling factor of 1 and so on. (see TS 38.211 [16], clause 6.3.3.2).

prach-ConfigurationSOffset-IAB

Subframe/Slot offset for ROs defined in the baseline configuration indicated by prach-ConfigurationIndex and is used only by the IAB-MT. (see TS 38.211 [16], clause 6.3.3.2).

preambleReceivedTargetPower

The target power level at the network receiver side (see TS 38.213 [13], clause 7.4, TS 38.321 [3], clauses 5.1.2, 5.1.3). Only multiples of 2 dBm may be chosen (e.g. -202, -200, -198, ...).

preambleTransMax

Max number of RA preamble transmission performed before declaring a failure (see TS 38.321 [3], clauses 5.1.4, 5.1.5).

ra-ResponseWindow

Msg2 (RAR) window length in number of slots. The network configures a value lower than or equal to 10 ms when Msg2 is transmitted in licensed spectrum and a value lower than or equal to 40 ms when Msg2 is transmitted with shared spectrum channel access (see TS 38.321 [3], clause 5.1.4). UE ignores the field if included in SCellConfig. If ra-ResponseWindow-v1610 or ra-ResponseWindow-v1700 is signalled, UE shall ignore the ra-ResponseWindow (without suffix). The field ra-ResponseWindow-v1700 is applicable to SCS 480 kHz and SCS 960 kHz.

zeroCorrelationZoneConfig

N-CS configuration, see Table 6.3.3.1-5 in TS 38.211 [16].

RACH-ConfigGenericTwoStepRA

The IE RACH-ConfigGenericTwoStepRA is used to specify the 2-step random access type parameters.

RACH-ConfigGenericTwoStepRA information element

```
-- ASN1START
-- TAG-RACH-CONFIGGENERICTWOSTEPRA-START
RACH-ConfigGenericTwoStepRA-r16 ::=
                                       SEOUENCE {
    msgA-PRACH-ConfigurationIndex-r16
                                           INTEGER (0..262)
                                                                                                            OPTIONAL, -- Cond 2StepOnly
   msqA-RO-FDM-r16
                                            ENUMERATED {one, two, four, eight}
                                                                                                            OPTIONAL, -- Cond 2StepOnly
                                           INTEGER (0..maxNrofPhysicalResourceBlocks-1)
                                                                                                            OPTIONAL, -- Cond 2StepOnly
   msgA-RO-FrequencyStart-r16
   msgA-ZeroCorrelationZoneConfig-r16
                                           INTEGER (0..15)
                                                                                                            OPTIONAL, -- Cond 2StepOnly
```

msgA-PreamblePowerRampingStep-r16

```
msgA-PreambleReceivedTargetPower-r16
msgB-ResponseWindow-r16

preambleTransMax-r16
...,
[[
msgB-ResponseWindow-v1700
]]
}
-- TAG-RACH-CONFIGGENERICTWOSTEPRA-STOP
```

-- ASN1STOP

```
ENUMERATED {dB0, dB2, dB4, dB6} OPTIONAL, -- Cond 2StepOnlyNoCFRA OPTIONAL, -- Cond 2StepOnlyNoCFRA OPTIONAL, -- Cond 2StepOnlyNoCFRA OPTIONAL, -- Cond 2StepOnlyNoCFRA OPTIONAL, -- Cond NoCFRA OPTIONAL, -- Cond NoCFRA OPTIONAL, -- Cond NoCFRA OPTIONAL, -- Cond NoCFRA OPTIONAL, -- Cond StepOnlyNoCFRA OPTIONAL, -- Cond NoCFRA OPTIONAL, -- Cond NoCFRA OPTIONAL -- CON
```

RACH-ConfigGenericTwoStepRA field descriptions

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msgA-PreamblePowerRampingStep

Power ramping steps for msgA PRACH. If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE shall apply the corresponding value in *RACH-ConfigCommon* in the same *AdditionalRACH-Config.* If the field is absent in other cases, UE shall use the value of *powerRampingStep* in *RACH-ConfigGeneric* in the configured BWP (see TS 38.321 [3], 5.1.3). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. The field is absent if *RACH-ConfigGenericTwoStepRA* is included in *CFRA-TwoStep* in *RACH-ConfigDedicated* and then the UE uses the value of *msgA-PreamblePowerRampingStep* in *RACH-ConfigGenericTwoStepRA* configured for CBRA.

msgA-PreambleReceivedTargetPower

The target power level at the network receiver side (see TS 38.213 [13], clause 7.1.1 and TS 38.321 [3], clause 5.1.1). Only multiples of 2 dBm may be chosen (e.g -202, -200, -198, ...). If the field is absent, UE shall use the value of *preambleReceivedTargetPower* in *RACH-ConfigGeneric* in the configured BWP. This field may only be present if no 4-step type RA is configured in the BWP. The field is absent if *RACH-ConfigGenericTwoStepRA* is included in *CFRA-TwoStep* in *RACH-ConfigDedicated* and then the UE uses the value of *msgA-PreambleReceivedTargetPower* in *RACH-ConfigGenericTwoStepRA* configured for CBRA.

msgA-PRACH-ConfigurationIndex

Cell-specific PRACH configuration index for 2-step RA type. If the field is absent in RACH-ConfigCommonTwoStepRA which is configured directly within a BWP (i.e. not within AdditionalRACH-Config), the UE shall use the value of corresponding 4-step random access parameter in the configured BWP. If the field is absent in RACH-ConfigCommonTwoStepRA in AdditionalRACH-Config, the UE shall apply the corresponding value in RACH-ConfigCommon in the same AdditionalRACH-Config. If the value is in the range of 256 to 262, the field prach-ConfigurationIndex-v1610 should be considered configured (see TS 38.211 [16], clause 6.3.3.2). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA.

msgA-RO-FDM

The number of msgA PRACH transmission occasions Frequency-Division Multiplexed in one time instance. If the field is absent in *RACH-ConfigCommonTwoStepRA* which is configured directly within a BWP (i.e. not within *AdditionalRACH-Config*), UE shall use value of msg1-FDM in RACH-ConfigGeneric in the configured BWP. If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE shall apply the value of msg1-FDM in RACH-ConfigCommon in the same *AdditionalRACH-Config* (see TS 38.211 [16], clause 6.3.3.2). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA.

msgA-RO-FrequencyStart

Offset of lowest PRACH transmissions occasion in frequency domain with respect to PRB 0. If the field is absent in *RACH-ConfigCommonTwoStepRA* which is configured directly within a BWP (i.e. not within *AdditionalRACH-Config*), UE shall use value of *msg1-FrequencyStart* in *RACH-ConfigGeneric* in the configured BWP. If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE shall apply the value of *msg1-FrequencyStart* in *RACH-ConfigCommon* in the same *AdditionalRACH-Config* (see TS 38.211 [16], clauses 5.3.2 and 6.3.3.2). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA.

msgA-ZeroCorrelationZoneConfig

N-CS configuration for msgA preamble, see Table 6.3.3.1-5 in TS 38.211 [16]. If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE shall apply the corresponding value in *RACH-ConfigCommon* in the same *AdditionalRACH-Config*. If the field is absent in other cases, UE shall use value *zeroCorrelationZoneConfig* in *RACH-ConfigGeneric* in the configured BWP. This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA.

msgB-ResponseWindow

MsgB monitoring window length in number of slots. The network configures a value lower than or equal to 40ms (see TS 38.321 [3], clause 5.1.1). The network does not configure msgB-ResponseWindow-r16 simultaneously with msgB-ResponseWindow-v1700, and if both fields are absent, the UE uses the value of msgB-ResponseWindow in RACH-ConfigGenericTwoStepRA configured for CBRA.

preambleTransMax

Max number of RA preamble transmission performed before declaring a failure (see TS 38.321 [3], clauses 5.1.4, 5.1.5). If the field is absent in RACH-ConfigCommonTwoStepRA in AdditionalRACH-Config, the UE shall apply the corresponding value in RACH-ConfigCommon in the same AdditionalRACH-Config. If the field is absent in other cases, UE shall use the value of preambleTransMax in RACH-ConfigGeneric in the configured BWP. The field is absent if RACH-ConfigGenericTwoStepRA is included in CFRA-TwoStep in RACH-ConfigDedicated and then the UE uses the value of preambleTransMax in RACH-ConfigGenericTwoStepRA configured for CBRA.

Conditional Presence	Explanation
2StepOnly	The field is mandatory present in <i>msgA-ConfigCommon</i> field in <i>BWP-UplinkCommon</i> if <i>rach-ConfigCommon</i> field is absent in this <i>BWP-UplinkCommon</i> , otherwise the field is optionally present in <i>msgA-ConfigCommon</i> field in <i>BWP-UplinkCommon</i> , Need S. The field is mandatory present in <i>msgA-ConfigCommon</i> in <i>AdditionalRACH-Config</i> if <i>rach-ConfigCommon</i> field is absent in
	this AdditionalRACH-Config, otherwise the field is optionally present in msgA-ConfigCommon field in AdditionalRACH-Config, Need S.
2StepOnlyNoCFRA	The field is mandatory present if RACH-ConfigGenericTwoStepRA is included in the RACH-ConfigCommonTwoStepRA and there are no 4-step random access configurations configured in the BWP (i.e only 2-step random access type configured in the BWP), otherwise (i.e. 4-step random access configuration also exists in the BWP) the field is optionally present, Need S. When RACH-ConfigGenericTwoStepRA is included in the RACH-ConfigDedicated, this field is absent.
NoCFRA	The field is mandatory present if <i>msgB-ResponseWindow-r17</i> is absent and <i>RACH-ConfigGenericTwoStepRA</i> is not included in <i>CFRA-TwoStep</i> in <i>RACH-ConfigDedicated</i> , otherwise the field is absent, Need S.
NoCFRA2	The field is mandatory present if <i>msgB-ResponseWindow-r16</i> is absent and <i>RACH-ConfigGenericTwoStepRA</i> is not included in <i>CFRA-TwoStep</i> in <i>RACH-ConfigDedicated</i> , otherwise the field is absent, Need S.

- RA-Prioritization

The IE *RA-Prioritization* is used to configure prioritized random access.

RA-Prioritization information element

RA-Prioritization field descriptions

powerRampingStepHighPrioritiy

Power ramping step applied for prioritized random access procedure.

scalingFactorBl

Scaling factor for the backoff indicator (BI) for the prioritized random access procedure. (see TS 38.321 [3], clause 5.1.4). Value zero corresponds to 0, value dot25 corresponds to 0.25 and so on.

RA-PrioritizationForSlicing

The IE RA-PrioritizationForSlicing is used to configure prioritized random access for slicing.

RA-PrioritizationForSlicing information element

```
-- ASN1START
-- TAG-RA-PRIORITIZATIONFORSLICING-START

RA-PrioritizationForSlicing-r17 ::= SEQUENCE {
    ra-PrioritizationSliceInfoList-r17 | RA-PrioritizationSliceInfoList-r17 | RA-PrioritizationSliceInfoList-r17 | SEQUENCE (SIZE (1..maxSliceInfo-r17)) OF RA-PrioritizationSliceInfo-r17

RA-PrioritizationSliceInfo-r17 ::= SEQUENCE {
    nsag-ID-List-r17 | SEQUENCE {
    nsag-ID-List-r17 | SEQUENCE (SIZE (1..maxSliceInfo-r17)) OF NSAG-ID-r17, ra-Prioritization-r17 | RA-Prioritization, ...
}

-- TAG-RA-PRIORITIZATIONFORSLICING-STOP |
-- ASN1STOP
```

RadioBearerConfig

The IE *RadioBearerConfig* is used to add, modify and release signalling, multicast MRBs and/or data radio bearers. Specifically, this IE carries the parameters for PDCP and, if applicable, SDAP entities for the radio bearers.

RadioBearerConfig information element

```
-- ASN1START
-- TAG-RADIOBEARERCONFIG-START
RadioBearerConfig ::=
                                       SEQUENCE {
    srb-ToAddModList
                                           SRB-ToAddModList
                                                                                                  OPTIONAL, -- Cond HO-Conn
    srb3-ToRelease
                                           ENUMERATED{true}
                                                                                                  OPTIONAL, -- Need N
    drb-ToAddModList
                                           DRB-ToAddModList
                                                                                                  OPTIONAL, -- Cond HO-toNR
   drb-ToReleaseList
                                           DRB-ToReleaseList
                                                                                                  OPTIONAL, -- Need N
                                                                                                  OPTIONAL, -- Need M
    securityConfig
                                           SecurityConfig
    . . . ,
    [ [
    mrb-ToAddModList-r17
                                           MRB-ToAddModList-r17
                                                                                                   OPTIONAL,
                                                                                                              -- Need N
    mrb-ToReleaseList-r17
                                           MRB-ToReleaseList-r17
                                                                                                  OPTIONAL, -- Need N
                                           SRB-ToAddMod
                                                                                                  OPTIONAL, -- Need N
    srb4-ToAddMod-r17
    srb4-ToRelease-r17
                                           ENUMERATED{true}
                                                                                                  OPTIONAL -- Need N
    11
```

```
SEOUENCE (SIZE (1..2)) OF SRB-ToAddMod
SRB-ToAddModList ::=
SRB-ToAddMod ::=
                                        SEOUENCE {
    srb-Identity
                                            SRB-Identity,
    reestablishPDCP
                                            ENUMERATED { true }
                                                                                                      OPTIONAL,
                                                                                                                  -- Need N
                                            ENUMERATED {true}
    discardOnPDCP
                                                                                                      OPTIONAL, -- Need N
    pdcp-Config
                                            PDCP-Config
                                                                                                      OPTIONAL,
                                                                                                                 -- Cond PDCP
    . . . ,
    ] ]
    srb-Identity-v1700
                                            SRB-Identity-v1700
                                                                                                      OPTIONAL
                                                                                                                  -- Need M
    11
DRB-ToAddModList ::=
                                        SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddMod
DRB-ToAddMod ::=
                                        SEOUENCE {
    cnAssociation
                                            CHOICE {
        eps-BearerIdentity
                                                INTEGER (0..15),
       sdap-Config
                                                SDAP-Config
                                                                                                      OPTIONAL,
                                                                                                                  -- Cond DRBSetup
                                            DRB-Identity,
    drb-Identity
    reestablishPDCP
                                            ENUMERATED { true }
                                                                                                      OPTIONAL,
                                                                                                                  -- Need N
                                                                                                                 -- Need N
    recoverPDCP
                                            ENUMERATED{true}
                                                                                                      OPTIONAL,
   pdcp-Config
                                            PDCP-Config
                                                                                                      OPTIONAL,
                                                                                                                  -- Cond PDCP
    . . . ,
    [ [
    daps-Config-r16
                                            ENUMERATED{true}
                                                                                                      OPTIONAL
                                                                                                                  -- Cond DAPS
    ]]
DRB-ToReleaseList ::=
                                        SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity
SecurityConfig ::=
                                        SEQUENCE {
    securityAlgorithmConfig
                                            SecurityAlgorithmConfig
                                                                                                      OPTIONAL,
                                                                                                                  -- Cond RBTermChangel
                                            ENUMERATED{master, secondary}
   keyToUse
                                                                                                      OPTIONAL, -- Cond RBTermChange
MRB-ToAddModList-r17 ::=
                                        SEQUENCE (SIZE (1..maxMRB-r17)) OF MRB-ToAddMod-r17
MRB-ToAddMod-r17 ::=
                                        SEOUENCE {
   mbs-SessionId-r17
                                            TMGI-r17
                                                                                                                  -- Cond MRBSetup
                                                                                                      OPTIONAL,
   mrb-Identity-r17
                                            MRB-Identity-r17,
   mrb-IdentityNew-r17
                                            MRB-Identity-r17
                                                                                                      OPTIONAL,
                                                                                                                  -- Need N
                                                                                                      OPTIONAL, -- Need N
   reestablishPDCP-r17
                                            ENUMERATED{true}
   recoverPDCP-r17
                                            ENUMERATED { true }
                                                                                                      OPTIONAL, -- Need N
                                                                                                      OPTIONAL, -- Cond PDCP
    pdcp-Config-r17
                                            PDCP-Config
MRB-ToReleaseList-r17 ::=
                                        SEQUENCE (SIZE (1..maxMRB-r17)) OF MRB-Identity-r17
-- TAG-RADIOBEARERCONFIG-STOP
```

-- ASN1STOP

DRB-ToAddMod and MRB-ToAddMod field descriptions

cnAssociation

Indicates if the bearer is associated with the eps-bearerIdentity (when connected to EPC) or sdap-Config (when connected to 5GC).

daps-Config

Indicates that the bearer is configured as DAPS bearer.

drb-Identity

In case of DC, the DRB identity is unique within the scope of the UE, i.e. an MCG DRB cannot use the same value as a split DRB. For a split DRB the same identity is used for the MCG and SCG parts of the configuration.

eps-BearerIdentity

The EPS bearer ID determines the EPS bearer.

mbs-SessionId

Indicates which multicast MBS session the bearer is associated with.

mrb-Identity

Identification of the multicast MRB.

mrb-IdentityNew

New identity of the multicast MRB when mrb-Identity needs to be changed, e.g. as a result of a handover.

reestablishPDCP

Indicates that PDCP should be re-established. Network sets this to *true* whenever the security key used for this radio bearer changes. Key change could for example be due to termination point change for the bearer, reconfiguration with sync, resuming an RRC connection, or the first reconfiguration after reestablishment. It is also applicable for LTE procedures when NR PDCP is configured. Network doesn't include this field for DRB if the bearer is configured as DAPS bearer.

recoverPDCP

Indicates that PDCP should perform recovery according to TS 38.323 [5]. Network doesn't include this field if the bearer is configured as DAPS bearer.

sdap-Config

The SDAP configuration determines how to map QoS flows to DRBs when NR or E-UTRA connects to the 5GC and presence/absence of UL/DL SDAP headers.

RadioBearerConfig field descriptions

securityConfig

Indicates the security algorithm and key to use for the signalling and data radio bearers configured with the list in this IE *RadioBearerConfig*. When the field is not included after AS security has been activated, the UE shall continue to use the currently configured *keyToUse* and security algorithm for the radio bearers reconfigured with the lists in this IE *RadioBearerConfig*. The field is not included when configuring SRB1 before AS security is activated.

srb3-ToRelease

Release SRB3. SRB3 release can only be done over SRB1 and only at SCG release and reconfiguration with sync.

SecurityConfig field descriptions

keyToUse

Indicates if the bearers configured with the list in this IE *RadioBearerConfig* are using the master key or the secondary key for deriving ciphering and/or integrity protection keys. For MR-DC, network should not configure SRB1 and SRB2 with secondary key and SRB3 with the master key. When the field is not included, the UE shall continue to use the currently configured *keyToUse* for the radio bearers reconfigured with the lists in this IE *RadioBearerConfig*.

securityAlgorithmConfig

Indicates the security algorithm for the signalling and data radio bearers configured with the list in this IE RadioBearerConfig. When the field is not included, the UE shall continue to use the currently configured security algorithm for the radio bearers reconfigured with the lists in this IE RadioBearerConfig.

SRB-ToAddMod field descriptions

discardOnPDCP

Indicates that PDCP should discard stored SDU and PDU according to TS 38.323 [5].

reestablishPDCP

Indicates that PDCP should be re-established. Network sets this to *true* whenever the security key used for this radio bearer changes. Key change could for example be due to reconfiguration with sync, for SRB2 when resuming an RRC connection, or at the first reconfiguration after RRC connection reestablishment in NR. For SRB1, when resuming an RRC connection, or at the first reconfiguration after RRC connection reestablishment in NR, the network does not set this field to *true*. For LTE SRBs using NR PDCP, it could be for handover, RRC connection reestablishment or resume. Network doesn't include this field if any DAPS bearer is configured.

srb-Identity, srb-Identity-v1700

Value 1 is applicable for SRB1 only. Value 2 is applicable for SRB2 only. Value 3 is applicable for SRB3 only. Value 4 is applicable for SRB4 only. If *srb-Identity-v1700* is received for an SRB, the UE shall ignore *srb-Identity* (i.e. without suffix) for this SRB.

Conditional Presence	Explanation
RBTermChange	The field is mandatory present in case of:
	- set up of signalling and data radio bearer,
	- change of termination point for the radio bearer between MN and SN.
	It is optionally present otherwise, Need S.
RBTermChange1	The field is mandatory present in case of:
	- set up of signalling and data radio bearer,
	- change of termination point for the radio bearer between MN and SN,
	- handover from E-UTRA/EPC or E-UTRA/5GC to NR,
	 handover from NR or E-UTRA/EPC to E-UTRA/5GC if the UE supports NGEN-DC.
	It is optionally present otherwise, Need S.
PDCP	The field is mandatory present if the corresponding DRB/multicast MRB is being setup or corresponding DRB/multicast MRB
	is reconfigured with NR PDCP or corresponding SRB associated with two RLC entities is being setup or if the number of
	RLC bearers associated with the DRB/multicast MRB or SRB is changed. The field is optionally present, Need S, if the
	corresponding SRB associated with one RLC entity is being setup or corresponding SRB is reconfigured with NR PDCP;
	otherwise the field is optionally present, need M.
DRBSetup	The field is mandatory present if the corresponding DRB is being setup; otherwise the field is optionally present, need M.
HO-Conn	The field is mandatory present
	 in case of inter-system handover from E-UTRA/EPC to E-UTRA/5GC or NR,
	- or when the fullConfig is included in the RRCReconfiguration message and NE-DC/NR-DC is not configured,
	- or in case of <i>RRCSetup</i> .
	Otherwise the field is optionally present, need N.
	Upon RRCSetup, only SRB1 can be present.
HO-toNR	If mrb-ToAddModList is not included, the field is mandatory present
	 in case of inter-system handover from E-UTRA/EPC to E-UTRA/5GC or NR,
	- or when the <i>fullConfig</i> is included in the <i>RRCReconfiguration</i> message and NE-DC/NR-DC is not configured.
	In case of <i>RRCSetup</i> , the field is absent; otherwise the field is optionally present, need N.
DAPS	The field is optionally present, need N, in case masterCellGroup includes ReconfigurationWithSync, SCell(s) and SCG are
	not configured, multi-DCI/single-DCI based multi-TRP are not configured in any DL BWP, supplementaryUplink is not
	configured, ethernetHeaderCompression is not configured for the DRB, conditionalReconfiguration is not configured, and NR
	sidelink and V2X sidelink are not configured. Otherwise the field is absent.
MRBSetup	The field is mandatory present if the corresponding multicast MRB is being setup; otherwise the field is optionally present,
	need M.

RadioLinkMonitoringConfig

The IE RadioLinkMonitoringConfig is used to configure radio link monitoring for detection of beam- and/or cell radio link failure. See also TS 38.321 [3], clause 5.1.1.

RadioLinkMonitoringConfig information element

```
-- ASN1START
-- TAG-RADIOLINKMONITORINGCONFIG-START
RadioLinkMonitoringConfig ::=
                                    SEOUENCE -
    failureDetectionResourcesToAddModList
                                            SEQUENCE (SIZE(1..maxNrofFailureDetectionResources)) OF RadioLinkMonitoringRS
                                                                                                                   OPTIONAL, -- Need N
    failureDetectionResourcesToReleaseList
                                            SEQUENCE (SIZE(1..maxNrofFailureDetectionResources)) OF RadioLinkMonitoringRS-Id
                                                                                                                   OPTIONAL, -- Need N
    beamFailureInstanceMaxCount
                                            ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10}
                                                                                                                   OPTIONAL, -- Need R
    beamFailureDetectionTimer
                                            ENUMERATED {pbfd1, pbfd2, pbfd3, pbfd4, pbfd5, pbfd6, pbfd8, pbfd10} OPTIONAL, -- Need R
    11
    beamfailure-r17
                                            BeamFailureDetection-r17
                                                                                                                   OPTIONAL -- Need R
BeamFailureDetection-r17 ::=
                                    SEOUENCE {
    failureDetectionSet1-r17
                                        BeamFailureDetectionSet-r17
                                                                                                                   OPTIONAL, -- Need R
                                                                                                                   OPTIONAL, -- Need R
    failureDetectionSet2-r17
                                        BeamFailureDetectionSet-r17
                                                                                                                   OPTIONAL -- Need R
    additionalPCI-r17
                                        Additional PCI Index-r17
RadioLinkMonitoringRS ::=
    radioLinkMonitoringRS-Id
                                        RadioLinkMonitoringRS-Id,
                                        ENUMERATED {beamFailure, rlf, both},
    purpose
    detectionResource
                                        CHOICE {
        ssb-Index
                                            SSB-Index,
        csi-RS-Index
                                            NZP-CSI-RS-ResourceId
BeamFailureDetectionSet-r17 ::=
                                    SEOUENCE {
    bfdResourcesToAddModList-r17
                                        SEQUENCE (SIZE(1..maxNrofBFDResourcePerSet-r17)) OF BeamLinkMonitoringRS-r17
                                                                                                                   OPTIONAL, -- Need N
    bfdResourcesToReleaseList-r17
                                        SEQUENCE (SIZE(1..maxNrofBFDResourcePerSet-r17)) OF BeamLinkMonitoringRS-Id-r17
                                                                                                                   OPTIONAL, -- Need N
    beamFailureInstanceMaxCount-r17
                                        ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10}
                                                                                                                   OPTIONAL, -- Need R
    beamFailureDetectionTimer-r17
                                        ENUMERATED {pbfd1, pbfd2, pbfd3, pbfd4, pbfd5, pbfd6, pbfd8, pbfd10}
                                                                                                                   OPTIONAL, -- Need R
BeamLinkMonitoringRS-r17 ::=
                                    SEQUENCE
    beamLinkMonitoringRS-Id-r17
                                        BeamLinkMonitoringRS-Id-r17,
    detectionResource-r17
                                        CHOICE {
        ssb-Index
                                        SSB-Index.
                                        NZP-CSI-RS-ResourceId
        csi-RS-Index
```

```
},
...
}
BeamLinkMonitoringRS-Id-r17 ::= INTEGER (0..maxNrofFailureDetectionResources-1-r17)
-- TAG-RADIOLINKMONITORINGCONFIG-STOP
-- ASN1STOP
```

RadioLinkMonitoringConfig field descriptions

additionalPCI

Indicates the physical cell IDs (PCI) of the SSBs in the failureDetectionSet2. If candidateBeamRS-List2 is configured in IE BeamFailureRecoveryRSConfig the field indicates the physical cell IDs (PCI) of the SSBs in the candidateBeamRS-List2.

beamFailureDetectionTimer

Timer for beam failure detection (see TS 38.321 [3], clause 5.17). See also the *BeamFailureRecoveryConfig* IE. Value in number of "Qout,LR reporting periods of Beam Failure Detection" Reference Signal (see TS 38.213 [13], clause 6). Value *pbfd1* corresponds to 1 Qout,LR reporting period of Beam Failure Detection Reference Signal, value *pbfd2* corresponds to 2 Qout,LR reporting periods of Beam Failure Detection Reference Signal and so on.

beamFailureInstanceMaxCount

This field determines after how many beam failure events the UE triggers beam failure recovery (see TS 38.321 [3], clause 5.17). Value n1 corresponds to 1 beam failure instance, value n2 corresponds to 2 beam failure instances and so on.

failureDetectionResourcesToAddModList

A list of reference signals for detecting beam failure and/or cell level radio link failure (RLF). The limits of the reference signals that the network can configure are specified in TS 38.213 [13], table 5-1. The network configures at most two detectionResources per BWP for the purpose *beamFailure* or *both*. If no RSs are provided for the purpose of beam failure detection, the UE performs beam monitoring based on the activated *TCI-State* for PDCCH as described in TS 38.213 [13], clause 6. If no RSs are provided in this list for the purpose of RLF detection, the UE performs Cell-RLM based on the activated *TCI-State* of PDCCH as described in TS 38.213 [13], clause 5. The network ensures that the UE has a suitable set of reference signals for performing cell-RLM. If *failureDetectionSet1-r17* and *failureDetectionSet2-r17* are present, the *purpose* of *RadioLinkMonitoringRS* in *failureDetectionResourcesToAddModList* only can be set to *rlf*.

failureDetectionSet1, failureDetectionSet2

Configures parameters for beamfailure detection towards beam failure detection resources configured in the set. If additional PCIs are configured using additionalPCI-ToAddModList for the serving cell, each RS in one set can be associated only with one PCI. Network always configures the failureDetectionSet1 and failureDetectionSet2 together. When a failureDetectionSetN is present, after the reconfiguration, the UE shall consider all the reference signals for this failure detection set as activated if at most maxBFD-RS-resourcesPerSetPerBWP-r17 reference signals are configured for each failure detection set, otherwise the UE shall considered all the reference signals in this failure detection set as deactivated.

RadioLinkMonitoringRS field descriptions

detectionResource

A reference signal that the UE shall use for radio link monitoring or beam failure detection (depending on the indicated *purpose*). Only periodic 1-port CSI-RS can be configured on SCell for beam failure detection purpose.

purpose

Determines whether the UE shall monitor the associated reference signal for the purpose of cell- and/or beam failure detection. For SCell, network only configures the value to beamFailure.

RadioLinkMonitoringRS-Id

The IE RadioLinkMonitoringRS-Id is used to identify one RadioLinkMonitoringRS.

RadioLinkMonitoringRS-Id information element

```
-- ASN1START
-- TAG-RADIOLINKMONITORINGRS-ID-START

RadioLinkMonitoringRS-Id ::= INTEGER (0..maxNrofFailureDetectionResources-1)
-- TAG-RADIOLINKMONITORINGRS-ID-STOP
-- ASN1STOP
```

RAN-AreaCode

The IE RAN-AreaCode is used to identify a RAN area within the scope of a tracking area.

RAN-AreaCode information element

```
-- ASN1START
-- TAG-RAN-AREACODE-START

RAN-AreaCode ::= INTEGER (0..255)

-- TAG-RAN-AREACODE-STOP
-- ASN1STOP
```

RateMatchPattern

The IE RateMatchPattern is used to configure one rate matching pattern for PDSCH, see TS 38.214 [19], clause 5.1.4.1.

RateMatchPattern information element

```
periodicityAndPattern
                                            CHOICE {
                                                   BIT STRING (SIZE (2)),
                                                   BIT STRING (SIZE (4)),
               n4
               n5
                                                   BIT STRING (SIZE (5)),
               n8
                                                   BIT STRING (SIZE (8)),
               n10
                                                   BIT STRING (SIZE (10)),
               n20
                                                   BIT STRING (SIZE (20)),
               n40
                                                   BIT STRING (SIZE (40))
                                           ControlResourceSetId
       controlResourceSet
    subcarrierSpacing
                                       SubcarrierSpacing
                                       ENUMERATED { dynamic, semiStatic },
    dummy
    . . . ,
    [ [
    controlResourceSet-r16
                                       ControlResourceSetId-r16
    ]]
-- TAG-RATEMATCHPATTERN-STOP
-- ASN1STOP
```

```
OPTIONAL, -- Need S

OPTIONAL, -- Cond CellLevel

OPTIONAL -- Need R
```

RateMatchPattern field descriptions

bitmaps

Indicates rate matching pattern by a pair of bitmaps resourceBlocks and symbolsInResourceBlock to define the rate match pattern within one or two slots, and a third bitmap periodicityAndPattern to define the repetition pattern with which the pattern defined by the above bitmap pair occurs.

controlResourceSet

This ControlResourceSet is used as a PDSCH rate matching pattern, i.e., PDSCH reception rate matches around it. In frequency domain, the resource is determined by the frequency domain resource of the CORESET with the corresponding CORESET ID. Time domain resource is determined by the parameters of the associated search space of the CORESET.

If the field controlResourceSetId-r16 is present, UE shall ignore the controlResourceSetId (without suffix).

periodicityAndPattern

A time domain repetition pattern at which the pattern defined by symbolsInResourceBlock and resourceBlocks recurs. This slot pattern repeats itself continuously. Absence of this field indicates the value n1 (see TS 38.214 [19], clause 5.1.4.1).

resourceBlocks

A resource block level bitmap in the frequency domain. A bit in the bitmap set to 1 indicates that the UE shall apply rate matching in the corresponding resource block in accordance with the *symbolsInResourceBlock* bitmap. If used as cell-level rate matching pattern, the bitmap identifies "common resource blocks (CRB)". If used for MBS broadcast CFR, the bitmap identifies "physical resource blocks" inside the BWP-level rate matching pattern, the bitmap identifies "physical resource blocks" inside the BWP or MBS multicast CFR. The first/ leftmost bit corresponds to resource block 0, and so on (see TS 38.214 [19], clause 5.1.4.1).

subcarrierSpacing

The SubcarrierSpacing for this resource pattern. If the field is absent, the UE applies the SCS of the associated BWP. The value kHz15 corresponds to μ =0, the value kHz30 corresponds to μ =1, and so on.

Only the following values are applicable depending on the used frequency (see TS 38.214 [19], clause 5.1.4.1):

FR1: 15, 30 or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

symbolsInResourceBlock

A symbol level bitmap in time domain. It indicates with a bit set to true that the UE shall rate match around the corresponding symbol. This pattern recurs (in time domain) with the configured periodicityAndPattern (see TS 38.214 [19], clause 5.1.4.1).

For *oneSlot*, if ECP is configured, the first 12 bits represent the symbols within the slot and the last two bits within the bitstring are ignored by the UE; Otherwise, the 14 bits represent the symbols within the slot.

For *twoSlots*, if ECP is configured, the first 12 bits represent the symbols within the first slot and the next 12 bits represent the symbols in the second slot and the last four bits within the bit string are ignored by the UE; Otherwise, the first 14 bits represent the symbols within the first slot and the next 14 bits represent the symbols in the second slot. For the bits representing symbols in a slot, the most significant bit of the bit string represents the first symbol in the slot and the second most significant bit represents the second symbol in the slot and so on.

Conditional Presence	Explanation
CellLevel	The field is mandatory present if the RateMatchPattern is defined on cell level. The field is absent when the
	RateMatchPattern is defined on BWP level or defined for MBS broadcast CFR. If the RateMatchPattern is defined on BWP
	level, the UE applies the SCS of the BWP and if RateMatchPattern is defined for MBS broadcast CFR, the UE applies the
	SCS of the initial BWP.

RateMatchPatternId

The IE RateMatchPatternId identifies one RateMatchMattern (see TS 38.214 [19], clause 5.1.4.2).

RateMatchPatternId information element

```
-- ASN1START
-- TAG-RATEMATCHPATTERNID-START

RateMatchPatternId ::= INTEGER (0..maxNrofRateMatchPatterns-1)

-- TAG-RATEMATCHPATTERNID-STOP
-- ASN1STOP
```

RateMatchPatternLTE-CRS

The IE RateMatchPatternLTE-CRS is used to configure a pattern to rate match around LTE CRS. See TS 38.214 [19], clause 5.1.4.2.

RateMatchPatternLTE-CRS information element

```
-- ASN1START
-- TAG-RATEMATCHPATTERNLTE-CRS-START
RateMatchPatternLTE-CRS ::=
                                   SEQUENCE {
    carrierFreqDL
                                       INTEGER (0..16383),
   carrierBandwidthDL
                                       ENUMERATED {n6, n15, n25, n50, n75, n100, spare2, spare1},
                                       EUTRA-MBSFN-SubframeConfigList
   mbsfn-SubframeConfigList
                                                                                                               OPTIONAL, -- Need M
                                       ENUMERATED {n1, n2, n4},
   nrofCRS-Ports
   v-Shift
                                       ENUMERATED {n0, n1, n2, n3, n4, n5}
LTE-CRS-PatternList-r16 ::=
                                   SEQUENCE (SIZE (1..maxLTE-CRS-Patterns-r16)) OF RateMatchPatternLTE-CRS
-- TAG-RATEMATCHPATTERNLTE-CRS-STOP
-- ASN1STOP
```

RateMatchPatternLTE-CRS field descriptions

carrierBandwidthDL

BW of the LTE carrier in number of PRBs (see TS 38.214 [19], clause 5.1.4.2).

carrierFreqDL

Center of the LTE carrier (see TS 38.214 [19], clause 5.1.4.2).

mbsfn-SubframeConfigList

LTE MBSFN subframe configuration (see TS 38.214 [19], clause 5.1.4.2).

nrofCRS-Ports

Number of LTE CRS antenna port to rate-match around (see TS 38.214 [19], clause 5.1.4.2).

v-Shift

Shifting value v-shift in LTE to rate match around LTE CRS (see TS 38.214 [19], clause 5.1.4.2).

ReferenceLocation

The IE *ReferenceLocation* contains location information used as a reference location. The value of the field is same as *Ellipsoid-Point* defined in TS37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

ReferenceLocation information element

```
-- ASN1START
-- TAG-REFERENCELOCATION-START

ReferenceLocation-r17 ::= OCTET STRING
-- TAG-REFERENCELOCATION-STOP
-- ASN1STOP
```

ReferenceTimeInfo

The IE ReferenceTimeInfo contains timing information for 5G internal system clock used for, e.g., time stamping, see TS 23.501 [32], clause 5.27.1.2.

ReferenceTimeInfo information element

```
-- ASN1START
-- TAG-REFERENCETIMEINFO-START
ReferenceTimeInfo-r16 ::= SEQUENCE {
    time-r16
                                      ReferenceTime-r16,
                                      INTEGER (0..32767)
   uncertainty-r16
                                                                 OPTIONAL, -- Need S
    timeInfoType-r16
                                      ENUMERATED {localClock}
                                                                 OPTIONAL, -- Need S
    referenceSFN-r16
                                      INTEGER (0..1023)
                                                                 OPTIONAL -- Cond RefTime
                              SEQUENCE {
ReferenceTime-r16 ::=
   refDays-r16
                                      INTEGER (0..72999),
   refSeconds-r16
                                      INTEGER (0..86399),
   refMilliSeconds-r16
                                      INTEGER (0..999),
   refTenNanoSeconds-r16
                                      INTEGER (0..99999)
-- TAG-REFERENCETIMEINFO-STOP
-- ASN1STOP
```

ReferenceTimeInfo field descriptions

referenceSFN

This field indicates the reference SFN corresponding to the reference time information. If referenceTimeInfo field is received in DLInformationTransfer message, this field indicates the SFN of PCell.

time

This field indicates time reference with 10ns granularity. If included in *DLInformationTransfer* and if UE-side TA PDC is de-activated, the indicated time may not be referenced at the network, i.e., gNB may pre-compensate for RF propagation delay. If included in *DLInformationTransfer* and if UE is requested to transmit UE Rx-Tx time difference measurement, the indicated time may not be referenced at the network, i.e., gNB may pre-compensate for RF propagation delay. Otherwise, the indicated time is referenced at the network, i.e., without compensating for RF propagation delay.

The indicated time in 10ns unit from the origin is refDays*86400*1000*100000 + refSeconds*1000*100000 + refMilliSeconds*100000 + refTenNanoSeconds. The refDays field specifies the sequential number of days (with day count starting at 0) from the origin of the time field.

If the reference TimeInfo field is received in DLInformationTransfer message, the time field indicates the time at the ending boundary of the system frame indicated by referenceSFN. The UE considers this frame (indicated by referenceSFN) to be the frame which is nearest to the frame where the message is received (which can be either in the past or in the future).

If the referenceTimeInfo field is received in SIB9, the time field indicates the time at the SFN boundary at or immediately after the ending boundary of the SI-window in which SIB9 is transmitted.

If referenceTimeInfo field is received in SIB9, this field is excluded when determining changes in system information, i.e. changes of time should neither result in system information change notifications nor in a modification of valueTag in SIB1.

timeInfoType

If timeInfoType is not included, the time indicates the GPS time and the origin of the time field is 00:00:00 on Gregorian calendar date 6 January, 1980 (start of GPS time). If timeInfoType is set to localClock, the origin of the time is unspecified.

uncertainty

This field indicates the uncertainty of the reference time information provided by the time field. The uncertainty is 25ns multiplied by this field. If this field is absent, the uncertainty is unspecified.

Conditional Presence	Explanation
RefTime	The field is mandatory present if referenceTimeInfo is included in DLInformationTransfer message; otherwise the field is
	absent.

– RejectWaitTime

The IE RejectWaitTime is used to provide the value in seconds for timer T302.

RejectWaitTime information element

- -- ASN1START
- -- TAG-REJECTWAITTIME-START

RejectWaitTime ::=

INTEGER (1..16)

- -- TAG-REJECTWAITTIME-STOP
- -- ASN1STOP

RepetitionSchemeConfig

The IE RepetitionSchemeConfig is used to configure the UE with repetition schemes as specified in TS 38.214 [19] clause 5.1.

RepetitionSchemeConfig information element

```
-- ASN1START
-- TAG-REPETITIONSCHEMECONFIG-START
RepetitionSchemeConfig-r16 ::= CHOICE {
    fdm-TDM-r16
                                      SetupRelease { FDM-TDM-r16 },
    slotBased-r16
                                      SetupRelease { SlotBased-r16 }
RepetitionSchemeConfig-v1630 ::= SEQUENCE {
    slotBased-v1630
                                      SetupRelease { SlotBased-v1630 }
FDM-TDM-r16 ::=
                              SEQUENCE {
                                  ENUMERATED {fdmSchemeA, fdmSchemeB,tdmSchemeA },
    repetitionScheme-r16
    startingSymbolOffsetK-r16
                                  INTEGER (0..7)
                                                                                    OPTIONAL -- Need R
SlotBased-r16 ::=
                              SEQUENCE {
    tciMapping-r16
                                  ENUMERATED {cyclicMapping, sequentialMapping},
    sequenceOffsetForRV-r16
                                  INTEGER (1..3)
SlotBased-v1630 ::=
    tciMapping-r16
                                  ENUMERATED {cyclicMapping, sequentialMapping},
    sequenceOffsetForRV-r16
                                  INTEGER (0)
-- TAG-REPETITIONSCHEMECONFIG-STOP
-- ASN1STOP
```

RepetitionSchemeConfig field descriptions

fdm-TDM

Configures UE with a repetition scheme among fdmSchemeA, fdmSchemeB and tdmSchemeA as specified in clause 5.1 of TS 38.214 [19]. The network does not set this field to release. Upon reception of this field in RepetitionSchemeConfig-r16, the UE shall release slotBased if previously configured in the same instance of RepetitionSchemeConfig-r16.

sequenceOffsetForRV

For slot-based repetition scheme, selected RV sequence is applied to transmission occasions associated to the first TCI state. The RV sequence associated to the second TCI state is determined by a RV offset from that selected RV sequence.

slotBased

Configures UE with slot-based repetition scheme. Network always configures this field when the parameter *repetitionNumber* is present in IE *PDSCH-TimeDomainResourceAllocationList*. The network does not set this field to *release*. Upon reception of this field in *RepetitionSchemeConfig-r16*, the UE shall release *fdm-TDM* if previously configured in the same instance of *RepetitionSchemeConfig-r16*.

startingSymbolOffsetK

The starting symbol of the second transmission occasion has K symbol offset relative to the last symbol of the first transmission occasion. When UE is configured with tdmSchemeA, the parameter startingSymbolOffsetK is present, otherwise absent.

tciMapping

Enables TCI state mapping method to PDSCH transmission occasions.

- ReportConfigId

The IE ReportConfigId is used to identify a measurement reporting configuration.

ReportConfigId information element

- -- ASN1START
- -- TAG-REPORTCONFIGID-START

ReportConfigId ::=

INTEGER (1..maxReportConfigId)

- -- TAG-REPORTCONFIGID-STOP
- -- ASN1STOP

ReportConfigInterRAT

The IE *ReportConfigInterRAT* specifies criteria for triggering of an inter-RAT measurement reporting event, or an L2 U2N relay measurement reporting event. The inter-RAT measurement reporting events for E-UTRA and UTRA-FDD are labelled BN with N equal to 1, 2 and so on. The measurement reporting events for L2 U2N relay UE are labelled YN with N equal to 1, 2 and so on.

- Event B1: Neighbour becomes better than absolute threshold;
- Event B2: PCell becomes worse than absolute threshold1 AND Neighbour becomes better than another absolute threshold2;
- Event Y1: PCell becomes worse than absolute threshold1 AND candidate L2 U2N Relay UE becomes better than another absolute threshold2;

Event Y2: Candidate L2 U2N Relay UE becomes better than absolute threshold;

ReportConfigInterRAT information element

```
-- ASN1START
-- TAG-REPORTCONFIGINTERRAT-START
ReportConfigInterRAT ::=
                                             SEQUENCE {
    reportType
                                                 CHOICE {
                                                      PeriodicalReportConfigInterRAT,
        periodical
                                                      EventTriggerConfigInterRAT,
        eventTriggered
        reportCGI
                                                      ReportCGI-EUTRA,
        . . . ,
        reportSFTD
                                                      ReportSFTD-EUTRA
                                             SEQUENCE {
ReportCGI-EUTRA ::=
    cellForWhichToReportCGI
                                     EUTRA-PhysCellId,
    . . . ,
    ] ]
    useAutonomousGaps-r16
                                     ENUMERATED {setup}
                                                                        OPTIONAL
                                                                                      -- Need R
    ]]
ReportSFTD-EUTRA ::=
                                          SEOUENCE {
                                                BOOLEAN,
    reportSFTD-Meas
    reportRSRP
                                                BOOLEAN,
EventTriggerConfigInterRAT ::=
                                             SEQUENCE {
    eventId
                                                 CHOICE {
        eventB1
                                                      SEQUENCE {
            b1-ThresholdEUTRA
                                                          MeasTriggerQuantityEUTRA,
            reportOnLeave
                                                          BOOLEAN,
            hysteresis
                                                          Hysteresis,
                                                          TimeToTrigger,
            timeToTrigger
                                                      SEQUENCE {
        eventB2
            b2-Threshold1
                                                          MeasTriggerQuantity,
            b2-Threshold2EUTRA
                                                         MeasTriggerQuantityEUTRA,
            reportOnLeave
                                                          BOOLEAN,
            hysteresis
                                                          Hysteresis,
            timeToTrigger
                                                         TimeToTrigger,
        . . . ,
        [ [
        eventB1-UTRA-FDD-r16
                                                       SEQUENCE {
            b1-ThresholdUTRA-FDD-r16
                                                          MeasTriggerQuantityUTRA-FDD-r16,
            reportOnLeave-r16
                                                          BOOLEAN,
```

```
hysteresis-r16
                                                         Hysteresis,
            timeToTrigger-r16
                                                         TimeToTrigger,
        eventB2-UTRA-FDD-r16
                                                      SEQUENCE {
           b2-Threshold1-r16
                                                         MeasTriggerOuantity,
           b2-Threshold2UTRA-FDD-r16
                                                         MeasTriggerOuantityUTRA-FDD-r16,
           reportOnLeave-r16
                                                         BOOLEAN.
           hysteresis-r16
                                                         Hysteresis,
           timeToTrigger-r16
                                                         TimeToTrigger,
       ĺ],
        Π
        eventY1-Relay-r17
                                                      SEOUENCE {
           y1-Threshold1-r17
                                                          MeasTriggerOuantity,
                                                          SL-MeasTriggerOuantity-r16,
           y1-Threshold2-Relay-r17
           reportOnLeave-r17
                                                          BOOLEAN,
           hysteresis-r17
                                                          Hysteresis,
            timeToTrigger-r17
                                                          TimeToTrigger,
       eventY2-Relay-r17
                                                      SEQUENCE {
           y2-Threshold-Relay-r17
                                                          SL-MeasTriggerQuantity-r16,
           reportOnLeave-r17
                                                          BOOLEAN,
           hysteresis-r17
                                                          Hysteresis,
           timeToTrigger-r17
                                                          TimeToTrigger,
       ]]
    rsType
                                        NR-RS-Type,
                                        ReportInterval,
    reportInterval
                                        ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    reportAmount
    reportQuantity
                                        MeasReportQuantity,
    maxReportCells
                                        INTEGER (1..maxCellReport),
    . . . ,
    ] ]
    reportQuantityUTRA-FDD-r16
                                        MeasReportQuantityUTRA-FDD-r16
                                                                                OPTIONAL -- Need R
    ]],
    Π
    includeCommonLocationInfo-r16
                                        ENUMERATED {true}
                                                                                                         OPTIONAL,
                                                                                                                     -- Need R
    includeBT-Meas-r16
                                        SetupRelease {BT-NameList-r16}
                                                                                                         OPTIONAL,
                                                                                                                     -- Need M
    includeWLAN-Meas-r16
                                        SetupRelease {WLAN-NameList-r16}
                                                                                                         OPTIONAL,
                                                                                                                     -- Need M
    includeSensor-Meas-r16
                                        SetupRelease {Sensor-NameList-r16}
                                                                                                         OPTIONAL
                                                                                                                     -- Need M
    11,
    ] ]
    reportQuantityRelay-r17
                                        SL-MeasReportQuantity-r16
                                                                                                         OPTIONAL
                                                                                                                     -- Need R
    ]]}
PeriodicalReportConfigInterRAT ::=
                                                SEQUENCE {
    reportInterval
                                                     ReportInterval,
    reportAmount
                                                     ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
```

```
reportOuantity
                                                    MeasReportOuantity,
   maxReportCells
                                                    INTEGER (1..maxCellReport),
    . . . ,
    ] ]
    reportOuantityUTRA-FDD-r16
                                                    MeasReportOuantityUTRA-FDD-r16
                                                                                           OPTIONAL
                                                                                                     -- Need R
    ]],
    ] ]
                                        ENUMERATED {true}
    includeCommonLocationInfo-r16
                                                                                                       OPTIONAL,
                                                                                                                   -- Need R
    includeBT-Meas-r16
                                        SetupRelease {BT-NameList-r16}
                                                                                                       OPTIONAL,
                                                                                                                   -- Need M
                                        SetupRelease {WLAN-NameList-r16}
    includeWLAN-Meas-r16
                                                                                                       OPTIONAL,
                                                                                                                   -- Need M
    includeSensor-Meas-r16
                                        SetupRelease {Sensor-NameList-r16}
                                                                                                       OPTIONAL
                                                                                                                   -- Need M
    11,
    11
    reportQuantityRelay-r17
                                        SL-MeasReportQuantity-r16
                                                                                                       OPTIONAL
                                                                                                                   -- Need R
    ]]
MeasTriggerQuantityUTRA-FDD-r16 ::=
    utra-FDD-RSCP-r16
                                                 INTEGER (-5..91),
   utra-FDD-EcN0-r16
                                                 INTEGER (0..49)
MeasReportQuantityUTRA-FDD-r16 ::=
                                          SEQUENCE {
    cpich-RSCP
                                              BOOLEAN,
    cpich-EcN0
                                              BOOLEAN
-- TAG-REPORTCONFIGINTERRAT-STOP
-- ASN1STOP
```

ReportConfigInterRAT field descriptions

reportType

Type of the configured measurement report. In (NG)EN-DC, and NR-DC, network does not configure report of type ReportCGI-EUTRA for SCG.

ReportCGI-EUTRA field descriptions

useAutonomousGaps

Indicates whether or not the UE is allowed to use autonomous gaps in acquiring system information from the E-UTRAN neighbour cell. When the field is included, the UE applies the corresponding value for T321.

EventTriggerConfigInterRAT field descriptions

b2-Threshold1

NR threshold to be used in inter RAT measurement report triggering condition for event B2.

bN-ThresholdEUTRA

E-UTRA threshold value associated with the selected trigger quantity (RSRP, RSRQ, SINR) to be used in inter RAT measurement report triggering condition for event number bN. In the same eventB2, the network configures the same CHOICE name (rsrp, rsrq or sinr) for the MeasTriggerQuantity of the b2-Threshold1 and for the MeasTriggerQuantityEUTRA of the b2-Threshold2EUTRA.

eventId

Choice of inter RAT event triggered reporting criteria.

maxReportCells

Max number of non-serving cells/candidate L2 U2N Relay UEs to include in the measurement report.

reportAmount

Number of measurement reports applicable for eventTriggered as well as for periodical report types

reportOnLeave

Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a cell in cellsTriggeredList, as specified in 5.5.4.1.

reportQuantity, reportQuantityUTRA-FDD

The cell measurement quantities to be included in the measurement report. If the field eventB1-UTRA-FDD or eventB2-UTRA-FDD is present, the UE shall ignore the value(s) provided in reportQuantity.

reportQuantityRelay

The L2 U2N Relay UE measurement quantity to be included in measuremet report.

timeToTrigger

Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

bN-ThresholdUTRA-FDD

UTRA-FDD threshold value associated with the selected trigger quantity (RSCP, EcN0) to be used in inter RAT measurement report triggering condition for event number bN. *utra-FDD-RSCP* corresponds to CPICH_RSCP in TS 25.133 [46] for FDD. *utra-FDD-EcN0* corresponds to CPICH_Ec/No in TS 25.133 [46] for FDD.

For *utra-FDD-RSCP*: The actual value is field value – 115 dBm.

For utra-FDD-EcN0: The actual value is (field value - 49)/2 dB.

v1-Threshold1

NR threshold to be used in measurement report triggering condition for event Y1.

vN-Threshold2-Relav

L2 U2N Relay threshold value associated with the selected trigger quantity (i.e. RSRP) to be used in measurement report triggering condition for event number YN.

PeriodicalReportConfigInterRAT field descriptions

maxReportCells

Max number of non-serving cells/candidate L2 U2N Relay UEs to include in the measurement report.

reportAmount

Number of measurement reports applicable for eventTriggered as well as for periodical report types

reportQuantity, reportQuantityUTRA-FDD

The cell measurement quantities to be included in the measurement report. If the field *reportQuantityUTRA-FDD* is present, the UE shall ignore the value(s) provided in *reportQuantity*.

ReportConfigNR

The IE *ReportConfigNR* specifies criteria for triggering of an NR measurement reporting event or of a CHO, CPA or CPC event or of an L2 U2N relay measurement reporting event. For events labelled AN with N equal to 1, 2 and so on, measurement reporting events and CHO, CPA or CPC events are based on cell measurement results, which can either be derived based on SS/PBCH block or CSI-RS.

- Event A1: Serving becomes better than absolute threshold;
- Event A2: Serving becomes worse than absolute threshold;
- Event A3: Neighbour becomes amount of offset better than PCell/PSCell;
- Event A4: Neighbour becomes better than absolute threshold;
- Event A5: PCell/PSCell becomes worse than absolute threshold1 AND Neighbour/SCell becomes better than another absolute threshold2;
- Event A6: Neighbour becomes amount of offset better than SCell:
- Event D1: Distance between UE and a reference location referenceLocation1 becomes larger than configured threshold distanceThreshFromReference1 and distance between UE and a reference location referenceLocation2 becomes shorter than configured threshold distanceThreshFromReference2;
- CondEvent A3: Conditional reconfiguration candidate becomes amount of offset better than PCell/PSCell;
- CondEvent A4: Conditional reconfiguration candidate becomes better than absolute threshold;
- CondEvent A5: PCell/PSCell becomes worse than absolute threshold1 AND Conditional reconfiguration candidate becomes better than another absolute threshold2;
- CondEvent D1: Distance between UE and a reference location referenceLocation1 becomes larger than configured threshold distanceThreshFromReference1 and distance between UE and a reference location referenceLocation2 of conditional reconfiguration candidate becomes shorter than configured threshold distanceThreshFromReference2;
- CondEvent T1: Time measured at UE becomes more than configured threshold *t1-Threshold* but is less than *t1-Threshold* + *duration*;
- Event X1: Serving L2 U2N Relay UE becomes worse than absolute threshold1 AND NR Cell becomes better than another absolute threshold2;
- Event X2: Serving L2 U2N Relay UE becomes worse than absolute threshold;
- For event I1, measurement reporting event is based on CLI measurement results, which can either be derived based on SRS-RSRP or CLI-RSSI.
 - Event I1: Interference becomes higher than absolute threshold.

ReportConfigNR information element

```
-- ASN1START
-- TAG-REPORTCONFIGNR-START

ReportConfigNR ::= SEQUENCE {
```

```
CHOICE {
    reportType
        periodical
                                                     Periodical Report Config,
        eventTriggered
                                                     EventTriggerConfig,
        reportCGI
                                                     ReportCGI,
        reportSFTD
                                                     ReportSFTD-NR,
        condTriggerConfig-r16
                                                     CondTriggerConfig-r16,
        cli-Periodical-r16
                                                     CLI-PeriodicalReportConfig-r16,
                                                     CLI-EventTriggerConfig-r16,
        cli-EventTriggered-r16
        rxTxPeriodical-r17
                                                     RxTxPeriodical-r17
ReportCGI ::=
                                   SEOUENCE {
    cellForWhichToReportCGI
                                      PhysCellId,
    ] ]
                                      ENUMERATED {setup}
    useAutonomousGaps-r16
                                                                         OPTIONAL -- Need R
    ]]
ReportSFTD-NR ::=
                                   SEQUENCE {
    reportSFTD-Meas
                                      BOOLEAN,
    reportRSRP
                                      BOOLEAN,
    . . . ,
    ] ]
    reportSFTD-NeighMeas
                                      ENUMERATED {true}
                                                                                        OPTIONAL,
                                                                                                     -- Need R
    drx-SFTD-NeighMeas
                                      ENUMERATED {true}
                                                                                                    -- Need R
                                                                                        OPTIONAL,
    cellsForWhichToReportSFTD
                                      SEQUENCE (SIZE (1..maxCellSFTD)) OF PhysCellId
                                                                                        OPTIONAL
                                                                                                     -- Need R
    11
CondTriggerConfig-r16 ::=
                                  SEQUENCE {
    condEventId
                                      CHOICE {
        condEventA3
                                          SEQUENCE {
            a3-Offset
                                              MeasTriggerQuantityOffset,
            hysteresis
                                              Hysteresis,
            timeToTrigger
                                              TimeToTrigger
        },
        condEventA5
                                          SEQUENCE {
            a5-Threshold1
                                              MeasTriggerQuantity,
            a5-Threshold2
                                              MeasTriggerQuantity,
            hysteresis
                                              Hysteresis,
            timeToTrigger
                                              TimeToTrigger
        . . . ,
        condEventA4-r17
                                          SEQUENCE {
            a4-Threshold-r17
                                              MeasTriggerQuantity,
            hysteresis-r17
                                              Hysteresis,
            timeToTrigger-r17
                                              TimeToTrigger
        condEventD1-r17
                                          SEQUENCE {
            distanceThreshFromReference1-r17 INTEGER(0.. 65525),
```

```
distanceThreshFromReference2-r17 INTEGER(0.. 65525),
            referenceLocation1-r17
                                              ReferenceLocation-r17,
                                              ReferenceLocation-r17,
            referenceLocation2-r17
            hysteresisLocation-r17
                                              HysteresisLocation-r17,
            timeToTrigger-r17
                                              TimeToTrigger
        condEventT1-r17
                                         SEOUENCE {
            t1-Threshold-r17
                                              INTEGER (0..549755813887),
            duration-r17
                                              INTEGER (1..6000)
                                     NR-RS-Type,
    rsType-r16
EventTriggerConfig::=
                                             SEOUENCE {
    eventId
                                                 CHOICE {
        event.A1
                                                     SEOUENCE {
            al-Threshold
                                                         MeasTriggerOuantity,
            reportOnLeave
                                                         BOOLEAN,
            hysteresis
                                                         Hysteresis,
            timeToTrigger
                                                         TimeToTrigger
        },
        eventA2
                                                     SEOUENCE {
            a2-Threshold
                                                         MeasTriggerQuantity,
            reportOnLeave
                                                         BOOLEAN,
            hysteresis
                                                         Hysteresis,
            timeToTrigger
                                                         TimeToTrigger
        },
        eventA3
                                                     SEOUENCE {
                                                         MeasTriggerQuantityOffset,
            a3-Offset
            reportOnLeave
                                                         BOOLEAN,
            hysteresis
                                                         Hysteresis,
            timeToTrigger
                                                         TimeToTrigger,
            useAllowedCellList
                                                         BOOLEAN
        },
        eventA4
                                                     SEQUENCE {
            a4-Threshold
                                                         MeasTriggerOuantity,
            reportOnLeave
                                                         BOOLEAN,
            hysteresis
                                                         Hysteresis,
            timeToTrigger
                                                         TimeToTrigger,
            useAllowedCellList
                                                         BOOLEAN
        },
        event.A5
                                                     SEQUENCE {
            a5-Threshold1
                                                         MeasTriggerQuantity,
            a5-Threshold2
                                                         MeasTriggerQuantity,
            reportOnLeave
                                                         BOOLEAN,
            hysteresis
                                                         Hysteresis,
            timeToTrigger
                                                         TimeToTrigger,
            useAllowedCellList
                                                         BOOLEAN
        },
        eventA6
                                                     SEQUENCE {
            a6-Offset
                                                         MeasTriggerQuantityOffset,
            reportOnLeave
                                                         BOOLEAN,
```

```
hysteresis
                                                     Hysteresis,
       timeToTrigger
                                                     TimeToTrigger,
       useAllowedCellList
                                                     BOOLEAN
   . . . ,
   ] ]
    eventX1-r17
                                                 SEOUENCE {
       x1-Threshold1-Relay-r17
                                                     SL-MeasTriggerOuantity-r16,
       x1-Threshold2-r17
                                                     MeasTriggerQuantity,
       reportOnLeave-r17
                                                     BOOLEAN,
       hysteresis-r17
                                                     Hysteresis,
       timeToTrigger-r17
                                                     TimeToTrigger,
       useAllowedCellList-r17
                                                     BOOLEAN
   eventX2-r17
                                                 SECUENCE {
       x2-Threshold-Relay-r17
                                                     SL-MeasTriggerOuantity-r16,
       reportOnLeave-r17
                                                     BOOLEAN,
       hysteresis-r17
                                                     Hysteresis,
       timeToTrigger-r17
                                                     TimeToTrigger
   eventD1-r17
                                                 SEQUENCE {
       distanceThreshFromReference1-r17
                                                     INTEGER(1.. 65525),
       distanceThreshFromReference2-r17
                                                     INTEGER(1.. 65525),
       referenceLocation1-r17
                                                     ReferenceLocation-r17,
       referenceLocation2-r17
                                                     ReferenceLocation-r17,
       reportOnLeave-r17
                                                     BOOLEAN.
       hysteresisLocation-r17
                                                     HysteresisLocation-r17,
       timeToTrigger-r17
                                                     TimeToTrigger
   ]]
},
                                            NR-RS-Type,
rsType
reportInterval
                                            ReportInterval,
                                            ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
reportAmount
                                            MeasReportOuantity,
reportQuantityCell
                                            INTEGER (1..maxCellReport),
maxReportCells
reportQuantityRS-Indexes
                                             MeasReportQuantity
                                                                                                             OPTIONAL, -- Need R
maxNrofRS-IndexesToReport
                                            INTEGER (1..maxNrofIndexesToReport)
                                                                                                                         -- Need R
                                                                                                             OPTIONAL,
includeBeamMeasurements
                                            BOOLEAN,
reportAddNeighMeas
                                            ENUMERATED {setup}
                                                                                                             OPTIONAL,
                                                                                                                         -- Need R
. . . ,
Π
measRSSI-ReportConfig-r16
                                            MeasRSSI-ReportConfig-r16
                                                                                                             OPTIONAL,
                                                                                                                         -- Need R
useT312-r16
                                            BOOLEAN
                                                                                                             OPTIONAL,
                                                                                                                         -- Need M
includeCommonLocationInfo-r16
                                            ENUMERATED {true}
                                                                                                             OPTIONAL, -- Need R
includeBT-Meas-r16
                                            SetupRelease {BT-NameList-r16}
                                                                                                             OPTIONAL,
                                                                                                                         -- Need M
                                            SetupRelease {WLAN-NameList-r16}
includeWLAN-Meas-r16
                                                                                                             OPTIONAL,
                                                                                                                         -- Need M
                                            SetupRelease {Sensor-NameList-r16}
includeSensor-Meas-r16
                                                                                                             OPTIONAL
                                                                                                                         -- Need M
11,
[ [
coarseLocationRequest-r17
                                            ENUMERATED {true}
                                                                                                             OPTIONAL,
                                                                                                                         -- Need R
reportQuantityRelay-r17
                                            SL-MeasReportOuantity-r16
                                                                                                             OPTIONAL
                                                                                                                         -- Need R
11
```

-- Need R

-- Need R

-- Need R

-- Need R

-- Need M

-- Need M

-- Need M

-- Need M

-- Need R

-- Need M

-- Need R

-- Need R

OPTIONAL,

OPTIONAL,

OPTIONAL.

OPTIONAL,

OPTIONAL,

OPTIONAL,

OPTIONAL,

OPTIONAL,

OPTIONAL

OPTIONAL,

OPTIONAL,

OPTIONAL

```
PeriodicalReportConfig ::=
                                             SEQUENCE {
    rsType
                                                 NR-RS-Type,
    reportInterval
                                                 ReportInterval,
    reportAmount
                                                 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
                                                 MeasReportQuantity,
    reportOuantityCell
    maxReportCells
                                                 INTEGER (1..maxCellReport),
    reportQuantityRS-Indexes
                                                 MeasReportQuantity
    maxNrofRS-IndexesToReport
                                                 INTEGER (1..maxNrofIndexesToReport)
    includeBeamMeasurements
                                                 BOOLEAN.
    useAllowedCellList
                                                 BOOLEAN,
    . . . ,
    11
    measRSSI-ReportConfig-r16
                                                 MeasRSSI-ReportConfig-r16
    includeCommonLocationInfo-r16
                                                 ENUMERATED {true}
    includeRT-Meas-r16
                                                 SetupRelease {BT-NameList-r16}
    includeWLAN-Meas-r16
                                                 SetupRelease {WLAN-NameList-r16}
                                                 SetupRelease {Sensor-NameList-r16}
    includeSensor-Meas-r16
                                                 SetupRelease { UL-DelayValueConfig-r16 }
    ul-DelayValueConfig-r16
                                                 ENUMERATED {setup}
    reportAddNeighMeas-r16
    ]],
    ] ]
    ul-ExcessDelayConfig-r17
                                                 SetupRelease { UL-ExcessDelayConfig-r17 }
                                                 ENUMERATED {true}
    coarseLocationRequest-r17
    reportQuantityRelay-r17
                                                 SL-MeasReportQuantity-r16
    ]]
                                             ENUMERATED {ssb, csi-rs}
NR-RS-Type ::=
MeasTriggerQuantity ::=
                                             CHOICE {
    rsrp
                                                 RSRP-Range,
                                                 RSRQ-Range,
    rsrq
    sinr
                                                 SINR-Range
MeasTriggerQuantityOffset ::=
                                             CHOICE {
                                                 INTEGER (-30..30),
    rsrp
                                                 INTEGER (-30..30),
    rsrq
    sinr
                                                 INTEGER (-30..30)
                                             SEQUENCE {
MeasReportQuantity ::=
    rsrp
                                                 BOOLEAN.
    rsrq
                                                 BOOLEAN,
    sinr
                                                 BOOLEAN
MeasRSSI-ReportConfig-r16 ::=
                                             SEOUENCE {
    channelOccupancyThreshold-r16
                                                 RSSI-Range-r16
                                                                        OPTIONAL -- Need R
CLI-EventTriggerConfig-r16 ::=
                                             SEQUENCE {
```

```
CHOICE {
    eventId-r16
       event.I1-r16
                                                    SEQUENCE {
            il-Threshold-r16
                                                        MeasTriggerQuantityCLI-r16,
            reportOnLeave-r16
                                                        BOOLEAN,
            hysteresis-r16
                                                        Hysteresis,
            timeToTrigger-r16
                                                        TimeToTrigger
    . . .
                                                ReportInterval,
    reportInterval-r16
    reportAmount-r16
                                                ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
                                                INTEGER (1..maxCLI-Report-r16),
    maxReportCLI-r16
CLI-PeriodicalReportConfig-r16 ::=
                                            SEOUENCE {
    reportInterval-r16
                                                ReportInterval,
                                                ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    reportAmount-r16
                                                MeasReportOuantityCLI-r16,
    reportQuantityCLI-r16
                                                INTEGER (1..maxCLI-Report-r16),
    maxReportCLI-r16
RxTxPeriodical-r17 ::=
                                            SEOUENCE {
    rxTxReportInterval-r17
                                                RxTxReportInterval-r17
                                                                                                    OPTIONAL, -- Need R
    reportAmount-r17
                                                ENUMERATED {r1, infinity, spare6, spare5, spare4, spare3, spare2, spare1},
    . . .
RXTXReportInterval-r17 ::= ENUMERATED {ms80,ms120,ms160,ms240,ms320,ms480,ms640,ms1024,ms1280,ms2048,ms2560,ms5120,spare4,spare3,spare2,spare1}
MeasTriggerQuantityCLI-r16 ::=
                                            CHOICE {
    srs-RSRP-r16
                                                SRS-RSRP-Range-r16,
    cli-RSSI-r16
                                                CLI-RSSI-Range-r16
MeasReportQuantityCLI-r16 ::=
                                            ENUMERATED {srs-rsrp, cli-rssi}
-- TAG-REPORTCONFIGNR-STOP
-- ASN1STOP
```

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CondTriggerConfig field descriptions

a3-Offset

Offset value(s) to be used in NR conditional reconfiguration triggering condition for cond event a3. The actual value is field value * 0.5 dB.

a4-Threshold

Threshold value associated to the selected trigger quantity (e.g. RSRP, RSRQ, SINR) per RS Type (e.g. SS/PBCH block, CSI-RS) to be used in NR conditional reconfiguration triggering condition for cond event a4.

a5-Threshold1/a5-Threshold2

Threshold value associated to the selected trigger quantity (e.g. RSRP, RSRQ, SINR) per RS Type (e.g. SS/PBCH block, CSI-RS) to be used in NR conditional reconfiguration triggering condition for cond event a5. In the same *condeventA5*, the network configures the same quantity for the *MeasTriggerQuantity* of the *a5-Threshold1* and for the *MeasTriggerQuantity* of the *a5-Threshold2*.

condEventId

Choice of NR conditional reconfiguration event triggered criteria.

distanceThreshFromReference1, distanceThreshFromReference2

Distance from a reference location configured with referenceLocation1 or referenceLocation2. Each step represents 50m.

duration

This field is used for defining the leaving condition T1-2 for conditional HO event condEventT1. Each step represents 100ms.

referenceLocation1, referenceLocation2

Reference locations used for condEventD1. The referenceLocation1 is associated to serving cell and referenceLocation2 is associated to candidate target cell.

t1-Threshold

The field counts the number of UTC seconds in 10 ms units since 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Sunday, December 31, 1899 and Monday, January 1, 1900).

timeToTrigger

Time during which specific criteria for the event needs to be met in order to execute the conditional reconfiguration evaluation.

ReportConfigNR field descriptions

reportType

Type of the configured measurement report. In MR-DC, network does not configure report of type reportCGI using SRB3. The condTriggerConfig is used for CHO, CPA or CPC configuration.

ReportCGI field descriptions

useAutonomousGaps

Indicates whether or not the UE is allowed to use autonomous gaps in acquiring system information from the NR neighbour cell. When the field is included, the UE applies the corresponding value for T321.

EventTriggerConfig field descriptions

a3-Offset/a6-Offset

Offset value(s) to be used in NR measurement report triggering condition for event a3/a6. The actual value is field value * 0.5 dB.

aN-ThresholdM

Threshold value associated to the selected trigger quantity (e.g. RSRP, RSRQ, SINR) per RS Type (e.g. SS/PBCH block, CSI-RS) to be used in NR measurement report triggering condition for event number aN. If multiple thresholds are defined for event number aN, the thresholds are differentiated by M. The network configures aN-Threshold1 only for events A1, A2, A4, A5 and a5-Threshold2 only for event A5. In the same *eventA5*, the network configures the same quantity for the *MeasTriggerQuantity* of the *a5-Threshold1* and for the *MeasTriggerQuantity* of the *a5-Threshold2*.

channelOccupancyThreshold

RSSI threshold which is used for channel occupancy evaluation.

coarseLocationRequest

This field is used to request UE to report coarse location information.

distanceThreshFromReference1, distanceThreshFromReference2

Threshold value associated to the distance from a reference location configured with referenceLocation1 or referenceLocation2. Each step represents 50m.

eventld

Choice of NR event triggered reporting criteria.

maxNrofRS-IndexesToReport

Max number of RS indexes to include in the measurement report for A1-A6 events.

maxReportCells

Max number of non-serving cells to include in the measurement report.

referenceLocation1. referenceLocation2

Reference locations used for eventD1. The referenceLocation1 is associated to serving cell and referenceLocation2 is associated to neighbour cell.

reportAddNeighMeas

Indicates that the UE shall include the best neighbour cells per serving frequency.

reportAmount

Number of measurement reports applicable for eventTriggered as well as for periodical report types.

reportOnLeave

Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a cell in *cellsTriggeredList*, as specified in 5.5.4.1. Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met if configured in *eventD1*, as specified in 5.5.4.1.

reportQuantityCell

The cell measurement quantities to be included in the measurement report.

reportQuantitvRS-Indexes

Indicates which measurement information per RS index the UE shall include in the measurement report.

timeToTrigger

Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

useAllowedCellList

Indicates whether only the cells included in the allow-list of the associated measObject are applicable as specified in 5.5.4.1.

useT312

If value *TRUE* is configured, the UE shall use the timer T312 with the value *t312* as specified in the corresponding *measObjectNR*. If value FALSE is configured, the timer T312 is considered as disabled. Network configures value *TRUE* only if *reportType* is set to *eventTriggered*.

xN-ThresholdM

Threshold value associated to the selected trigger quantity (e.g. RSRP, RSRQ, SINR) per RS Type (e.g. SS/PBCH block, CSI-RS) to be used in NR measurement report triggering condition for event xN. If multiple thresholds are defined for event number xN, the thresholds are differentiated by M. x1-Threshold1 and x2-Threshold indicates the threshold value for the serving L2 U2N Relay UE, x1-Threshold2 indicates the threshold value for the NR Cells.

CLI-EventTriggerConfig field descriptions

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i1-Threshold

Threshold value associated to the selected trigger quantity (e.g. SRS-RSRP, CLI-RSSI) to be used in CLI measurement report triggering condition for event i1.

eventld

Choice of CLI event triggered reporting criteria.

maxReportCLI

Max number of CLI measurement resource to include in the measurement report.

reportAmount

Number of measurement reports.

reportOnLeave

Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a CLI measurement resource in srsTriggeredList or rssiTriggeredList, as specified in 5.5.4.1.

timeToTrigger

Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

CLI-PeriodicalReportConfig field descriptions

maxReportCLI

Max number of CLI measurement resource to include in the measurement report.

reportAmount

Number of measurement reports.

reportQuantityCLI

The CLI measurement quantities to be included in the measurement report.

PeriodicalReportConfig field descriptions

coarseLocationRequest

This field is used to request UE to report coarse location information.

maxNrofRS-IndexesToReport

Max number of RS indexes to include in the measurement report.

maxReportCells

Max number of non-serving cells to include in the measurement report.

reportAddNeighMeas

Indicates that the UE shall include the best neighbour cells per serving frequency.

reportAmount

Number of measurement reports applicable for eventTriggered as well as for periodical report types

reportQuantityCell

The cell measurement quantities to be included in the measurement report.

reportQuantityRS-Indexes

Indicates which measurement information per RS index the UE shall include in the measurement report.

ul-DelayValueConfig

If the field is present, the UE shall perform the actual UL PDCP Packet Average Delay measurement per DRB as specified in TS 38.314 [53] and the UE shall ignore the fields reportQuantityCell and maxReportCells. The applicable values for the corresponding reportInterval are (one of the) {ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1,min6, min12, min30}. The reportInterval indicates the periodicity for performing and reporting of UL PDCP Packet Average Delay per DRB measurement as specified in TS 38.314 [53].

ul-ExcessDelayConfig

If the field is present, the UE shall perform the actual UL PDCP Excess Packet Delay per DRB measurement as specified in TS 38.314 [53] and the UE shall ignore the fields reportQuantityCell and maxReportCells. The applicable values for the corresponding reportInterval are (one of the) {ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1,min6, min12, min30}. The reportInterval indicates the periodicity for performing and reporting of UL PDCP Excess Packet Delay per DRB measurement as specified in TS 38.314 [53].

useAllowedCellList

Indicates whether only the cells included in the allow-list of the associated measObject are applicable as specified in 5.5.4.1.

ReportSFTD-NR field descriptions

cellForWhichToReportSFTD

Indicates the target NR neighbour cells for SFTD measurement between PCell and NR neighbour cells.

drx-SFTD-NeighMeas

Indicates that the UE shall use available idle periods (i.e. DRX off periods) for the SFTD measurement in NR standalone. The network only includes drx-SFTD-NeighMeas field when reprtSFTD-NeighMeas is set to true.

reportSFTD-Meas

Indicates whether UE is required to perform SFTD measurement between PCell and NR PSCell in NR-DC.

reportSFTD-NeighMeas

Indicates whether UE is required to perform SFTD measurement between PCell and NR neighbour cells in NR standalone. The network does not include this field if reportSFTD-Meas is set to true.

reportRSRP

Indicates whether UE is required to include RSRP result of NR PSCell or NR neighbour cells in SFTD measurement result, derived based on SSB. If it is set to true, the network should ensure that ssb-ConfigMobility is included in the measurement object for NR PSCell or NR neighbour cells.

RxTxPeriodical field descriptions

reportAmount

This field indicates the number of UE Rx-Tx time difference measurement reports. If configured to r1, the network does not configure rxTxReportInterval and only one measurement is reported. If configured to infinity, UE periodically reports measurements according to the periodicity configured by rxTxReportInterval.

rxTxReportInterval

This field indicates the measurement reporting periodicity of UE Rx-Tx time difference.

other field descriptions

MeasTriggerQuantity

SINR is applicable only for CONNECTED mode events.

ReportConfigNR-SL

The IE *ReportConfigNR-SL* specifies criteria for triggering of a CBR measurement reporting event for NR sidelink communication. Measurement reporting events are based on CBR measurement results on the corresponding transmission resource pools. These events are labelled CN with N equal to 1 and 2.

Event C1: CBR of NR sidelink communication becomes better than absolute threshold:

Event C2: CBR of NR sidelink communication becomes worse than absolute threshold;

ReportConfigNR-SL information element

```
-- ASN1START
-- TAG-REPORTCONFIGNR-SL-START
ReportConfigNR-SL-r16 ::=
                                    SEQUENCE {
    reportType-r16
                                        CHOICE {
       periodical-r16
                                             PeriodicalReportConfigNR-SL-r16,
       eventTriggered-r16
                                             EventTriggerConfigNR-SL-r16
EventTriggerConfigNR-SL-r16::=
                                    SEOUENCE {
                                        CHOICE {
    eventId-r16
       eventC1
                                             SEQUENCE -
           c1-Threshold-r16
                                                SL-CBR-r16,
           hysteresis-r16
                                                Hysteresis,
           timeToTrigger-r16
                                                TimeToTrigger
        eventC2-r16
                                    SEQUENCE {
           c2-Threshold-r16
                                        SL-CBR-r16,
           hysteresis-r16
                                        Hysteresis,
           timeToTrigger-r16
                                        TimeToTrigger
    reportInterval-r16
                                    ReportInterval,
```

```
ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    reportAmount-r16
   reportOuantity-r16
                                    MeasReportOuantity-r16,
PeriodicalReportConfigNR-SL-r16 ::= SEQUENCE {
    reportInterval-r16
                                        ReportInterval,
                                        ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    reportAmount-r16
   reportQuantity-r16
                                        MeasReportQuantity-r16,
MeasReportQuantity-r16 ::=
                                    SEOUENCE {
    cbr-r16
                                        BOOLEAN.
-- TAG-REPORTCONFIGNR-SL-STOP
-- ASN1STOP
```

ReportConfigNR-SL field descriptions

reportType

Type of the configured CBR measurement report for NR sidelink communication.

EventTriggerConfigNR-SL field descriptions

cN-Threshold

Threshold used for events C1 and C2 specified in clauses 5.5.4.11 and 5.5.4.12, respectively.

eventld

Choice of NR event triggered reporting criteria.

reportAmoun

Number of measurement reports applicable for eventTriggered as well as for periodical report types.

reportQuantity

The sidelink measurement quantities to be included in the measurement report. In this release, this is set as the CBR measurement result.

timeToTriager

Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

PeriodicalReportConfigNR-SL field descriptions

reportAmount

Number of measurement reports applicable for eventTriggered as well as for periodical report types.

reportQuantity

The sidelink measurement quantities to be included in the measurement report. In this release, this is set as the CBR measurement result.

ReportConfigToAddModList

The IE ReportConfigToAddModList concerns a list of reporting configurations to add or modify.

ReportConfigToAddModList information element

```
-- ASN1START
-- TAG-REPORTCONFIGTOADDMODLIST-START
ReportConfigToAddModList ::=
                                SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigToAddMod
ReportConfigToAddMod ::= SEQUENCE {
                                    ReportConfigId,
   reportConfigId
   reportConfig
                                    CHOICE {
      reportConfigNR
                                       ReportConfigNR,
                                       ReportConfigInterRAT,
      reportConfigInterRAT
       reportConfigNR-SL-r16
                                       ReportConfigNR-SL-r16
-- TAG-REPORTCONFIGTOADDMODLIST-STOP
-- ASN1STOP
```

- ReportInterval

The IE *ReportInterval* indicates the interval between periodical reports. The *ReportInterval* is applicable if the UE performs periodical reporting (i.e. when *reportAmount* exceeds 1), for *triggerTypeevent* as well as for *triggerTypeeviodical*. Value *ms120* corresponds to 120 ms, value *ms240* corresponds to 240 ms and so on, while value *min1* corresponds to 1 min, *min6* corresponds to 6 min and so on.

ReportInterval information element

ReselectionThreshold

The IE ReselectionThreshold is used to indicate an Rx level threshold for cell reselection. Actual value of threshold = field value * 2 [dB].

ReselectionThreshold information element

```
-- ASN1START
-- TAG-RESELECTIONTHRESHOLD-START

ReselectionThreshold ::= INTEGER (0..31)

-- TAG-RESELECTIONTHRESHOLD-STOP
-- ASN1STOP
```

ReselectionThresholdQ

The IE ReselectionThresholdQ is used to indicate a quality level threshold for cell reselection. Actual value of threshold = field value [dB].

ReselectionThresholdQ information element

```
-- ASN1START
-- TAG-RESELECTIONTHRESHOLDQ-START

ReselectionThresholdQ ::= INTEGER (0..31)

-- TAG-RESELECTIONTHRESHOLDQ-STOP
-- ASN1STOP
```

ResumeCause

The IE ResumeCause is used to indicate the resume cause in RRCResumeRequest and RRCResumeRequest1.

ResumeCause information element

RLC-BearerConfig

The IE RLC-BearerConfig is used to configure an RLC entity, a corresponding logical channel in MAC and the linking to a PDCP entity (served radio bearer).

-- ASN1STOP

RLC-BearerConfig information element

```
-- ASN1START
-- TAG-RLC-BEARERCONFIG-START
RLC-BearerConfig ::=
                                            SEQUENCE {
    logicalChannelIdentity
                                                LogicalChannelIdentity,
    servedRadioBearer
                                                CHOICE {
       srb-Identity
                                                    SRB-Identity,
        drb-Identity
                                                    DRB-Identity
                                                                                                    OPTIONAL,
                                                                                                                -- Cond LCH-SetupOnly
    reestablishRLC
                                                ENUMERATED {true}
                                                                                                    OPTIONAL, -- Need N
    rlc-Config
                                                                                                    OPTIONAL, -- Cond LCH-Setup
                                                RLC-Config
    mac-LogicalChannelConfig
                                                LogicalChannelConfig
                                                                                                    OPTIONAL, -- Cond LCH-Setup
    . . . ,
    [ [
    rlc-Config-v1610
                                                RLC-Config-v1610
                                                                                                    OPTIONAL
                                                                                                                -- Need R
    ]],
    ] ]
    rlc-Config-v1700
                                                RLC-Config-v1700
                                                                                                    OPTIONAL,
                                                                                                                -- Need R
    logicalChannelIdentityExt-r17
                                                LogicalChannelIdentityExt-r17
                                                                                                    OPTIONAL, -- Cond LCH-SetupModMRB
                                                                                                    OPTIONAL, -- Cond LCH-SetupOnlyMRB
    multicastRLC-BearerConfig-r17
                                                MulticastRLC-BearerConfig-r17
    servedRadioBearerSRB4-r17
                                                                                                    OPTIONAL
                                                                                                                -- Need N
                                                SRB-Identity-v1700
    ]]
MulticastRLC-BearerConfig-r17 ::=
                                            SEOUENCE {
    servedMBS-RadioBearer-r17
                                                MRB-Identity-r17,
    isPTM-Entity-r17
                                                ENUMERATED {true}
                                                                                                    OPTIONAL
                                                                                                                -- Need S
LogicalChannelIdentityExt-r17 ::=
                                            INTEGER (320..65855)
-- TAG-RLC-BEARERCONFIG-STOP
```

RLC-BearerConfig field descriptions

isPTM-Entity

If configured, indicates that the RLC entity is used for PTM reception. When the field is absent the RLC entity is used for PTP transmission/reception.

logicalChannelldentity

ID used commonly for the MAC logical channel and for the RLC bearer. Value 4 is not configured for DRBs if SRB4 is configured.

logicalChannelIdentityExt

Extended logical channel ID used commonly for the MAC logical channel and for the RLC bearer for PTM reception. If this field is configured, the UE shall ignore logicalChannelIdentity.

reestablishRLC

Indicates that RLC should be re-established. Network sets this to *true* at least whenever the security key used for the radio bearer associated with this RLC entity changes. For SRB2, multicast MRBs and DRBs, unless full configuration is used, it is also set to *true* during the resumption of the RRC connection or the first reconfiguration after reestablishment. For SRB1, when resuming an RRC connection, or at the first reconfiguration after RRC connection reestablishment, the network does not set this field to *true*.

rlc-Config

Determines the RLC mode (UM, AM) and provides corresponding parameters. RLC mode reconfiguration can only be performed by DRB/multicast MRB release/addition or full configuration. The network may configure *rlc-Config-v1610* only when *rlc-Config* (without suffix) is set to *am*.

servedMBS-RadioBearer

Associates the RLC Bearer with a multicast MRB. The UE shall deliver DL RLC SDUs received via the RLC entity of this RLC bearer to the PDCP entity of the servedMBS-RadioBearer.

servedRadioBearer, servedRadioBearer\$RB4

Associates the RLC Bearer with an SRB or a DRB. The UE shall deliver DL RLC SDUs received via the RLC entity of this RLC bearer to the PDCP entity of the servedRadioBearer. Furthermore, the UE shall advertise and deliver uplink PDCP PDUs of the uplink PDCP entity of the servedRadioBearer to the uplink RLC entity of this RLC bearer unless the uplink scheduling restrictions (moreThanOneRLC in PDCP-Config and the restrictions in LogicalChannelConfig) forbid it to do so.

Conditional Presence	Explanation
LCH-Setup	This field is mandatory present upon creation of a new logical channel for a DRB or a multicast MRB. This field is optionally present, Need
	S, upon creation of a new logical channel for an SRB. It is optionally present, Need M, otherwise.
LCH-SetupModMRB	This field is optionally present upon creation of a new logical channel for PTM reception for a multicast MRB. If this field is included upon
	creation of a new logical channel for PTM reception for a multicast MRB, it shall be present when modifying this logical channel. The field is
	absent for logical channels configured for an SRB and a DRB.
LCH-SetupOnly	This field is mandatory present upon creation of a new logical channel for a DRB or an SRB (servedRadioBearer). It is absent, Need M
	otherwise.
LCH-SetupOnlyMRB	This field is mandatory present upon creation of a new logical channel for a multicast MRB and upon modification of MRB-Identity of the
	served MRB. It is absent, Need M otherwise.

RLC-Config

The IE *RLC-Config* is used to specify the RLC configuration of SRBs, multicast MRBs and DRBs.

RLC-Config information element

```
-- ASN1START
-- TAG-RLC-CONFIG-START

RLC-Config ::= CHOICE {
```

```
SEQUENCE {
       ul-AM-RLC
                                            UL-AM-RLC,
        dl-AM-RLC
                                            DL-AM-RLC
    um-Bi-Directional
                                        SEOUENCE {
       ul-UM-RLC
                                            UL-UM-RLC,
        dl-UM-RLC
                                            DL-UM-RLC
    um-Uni-Directional-UL
                                        SEQUENCE {
       ul-UM-RLC
                                            UL-UM-RLC
    um-Uni-Directional-DL
                                        SEQUENCE {
        dl-UM-RLC
                                            DL-UM-RLC
    },
UL-AM-RLC ::=
                                    SEOUENCE {
                                        SN-FieldLengthAM
    sn-FieldLength
                                                                                             OPTIONAL, -- Cond Reestab
    t-PollRetransmit
                                        T-PollRetransmit,
   pollPDU
                                        PollPDU,
   pollByte
                                        PollByte,
    maxRetxThreshold
                                        ENUMERATED { t1, t2, t3, t4, t6, t8, t16, t32 }
DL-AM-RLC ::=
                                    SEOUENCE {
    sn-FieldLength
                                        SN-FieldLengthAM
                                                                                             OPTIONAL, -- Cond Reestab
    t-Reassembly
                                        T-Reassembly,
    t-StatusProhibit
                                        T-StatusProhibit
UL-UM-RLC ::=
                                    SEQUENCE {
    sn-FieldLength
                                        SN-FieldLengthUM
                                                                                             OPTIONAL
                                                                                                         -- Cond Reestab
                                    SEQUENCE {
DL-UM-RLC ::=
    sn-FieldLength
                                        SN-FieldLengthUM
                                                                                             OPTIONAL,
                                                                                                        -- Cond Reestab
                                        T-Reassembly
    t-Reassembly
T-PollRetransmit ::=
                                    ENUMERATED {
                                        ms5, ms10, ms15, ms20, ms25, ms30, ms35,
                                        ms40, ms45, ms50, ms55, ms60, ms65, ms70,
                                        ms75, ms80, ms85, ms90, ms95, ms100, ms105,
                                        ms110, ms115, ms120, ms125, ms130, ms135,
                                        ms140, ms145, ms150, ms155, ms160, ms165,
                                        ms170, ms175, ms180, ms185, ms190, ms195,
                                        ms200, ms205, ms210, ms215, ms220, ms225,
                                        ms230, ms235, ms240, ms245, ms250, ms300,
                                        ms350, ms400, ms450, ms500, ms800, ms1000,
                                        ms2000, ms4000, ms1-v1610, ms2-v1610, ms3-v1610,
                                        ms4-v1610, spare1}
```

```
PollPDU ::=
                                    ENUMERATED {
                                        p4, p8, p16, p32, p64, p128, p256, p512, p1024, p2048, p4096, p6144, p8192, p12288, p16384, p20480,
                                        p24576, p28672, p32768, p40960, p49152, p57344, p65536, infinity, spare8, spare7, spare6, spare5, spare4,
                                        spare3, spare2, spare1}
                                    ENUMERATED {
PollByte ::=
                                        kB1, kB2, kB5, kB8, kB10, kB15, kB25, kB50, kB75,
                                        kB100, kB125, kB250, kB375, kB500, kB750, kB1000,
                                        kB1250, kB1500, kB2000, kB3000, kB4000, kB4500,
                                        kB5000, kB5500, kB6000, kB6500, kB7000, kB7500,
                                        mB8, mB9, mB10, mB11, mB12, mB13, mB14, mB15,
                                        mB16, mB17, mB18, mB20, mB25, mB30, mB40, infinity,
                                        spare20, spare19, spare18, spare17, spare16,
                                        spare15, spare14, spare13, spare12, spare11,
                                        spare10, spare9, spare8, spare7, spare6, spare5,
                                        spare4, spare3, spare2, spare1}
T-Reassembly ::=
                                    ENUMERATED {
                                        ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,
                                        ms40, ms45, ms50, ms55, ms60, ms65, ms70,
                                        ms75, ms80, ms85, ms90, ms95, ms100, ms110,
                                        ms120, ms130, ms140, ms150, ms160, ms170,
                                        ms180, ms190, ms200, spare1}
T-StatusProhibit ::=
                                    ENUMERATED {
                                        ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,
                                        ms40, ms45, ms50, ms55, ms60, ms65, ms70,
                                        ms75, ms80, ms85, ms90, ms95, ms100, ms105,
                                        ms110, ms115, ms120, ms125, ms130, ms135,
                                        ms140, ms145, ms150, ms155, ms160, ms165,
                                        ms170, ms175, ms180, ms185, ms190, ms195,
                                        ms200, ms205, ms210, ms215, ms220, ms225,
                                        ms230, ms235, ms240, ms245, ms250, ms300,
                                        ms350, ms400, ms450, ms500, ms800, ms1000,
                                        ms1200, ms1600, ms2000, ms2400, spare2, spare1}
SN-FieldLengthUM ::=
                                    ENUMERATED {size6, size12}
                                    ENUMERATED {size12, size18}
SN-FieldLengthAM ::=
RLC-Config-v1610 ::=
                                    SEOUENCE {
    dl-AM-RLC-v1610
                                        DL-AM-RLC-v1610
RLC-Config-v1700 ::=
                                    SEQUENCE {
    dl-AM-RLC-v1700
                                        DL-AM-RLC-v1700,
    dl-UM-RLC-v1700
                                        DL-UM-RLC-v1700
DL-AM-RLC-v1610 ::=
                                    SEOUENCE {
                                                                                             OPTIONAL, -- Need N
    t-StatusProhibit-v1610
                                        T-StatusProhibit-v1610
                                    SEOUENCE {
DL-AM-RLC-v1700 ::=
```

```
t-ReassemblyExt-r17
                                        T-ReassemblyExt-r17
                                                                                              OPTIONAL
                                                                                                          -- Need N
DL-UM-RLC-v1700 ::=
                                    SEOUENCE {
    t-ReassemblyExt-r17
                                        T-ReassemblyExt-r17
                                                                                              OPTIONAL
                                                                                                          -- Need N
T-StatusProhibit-v1610 ::=
                                    ENUMERATED { ms1, ms2, ms3, ms4, spare4, spare3, spare2, spare1}
T-ReassemblyExt-r17 ::=
                                    ENUMERATED {ms210, ms220, ms340, ms350, ms550, ms1100, ms1650, ms2200}
-- TAG-RLC-CONFIG-STOP
-- ASN1STOP
```

RLC-Config field descriptions

maxRetxThreshold

Parameter for RLC AM in TS 38.322 [4]. Value t1 corresponds to 1 retransmission, value t2 corresponds to 2 retransmissions and so on.

pollByte

Parameter for RLC AM in TS 38.322 [4]. Value *kB25* corresponds to 25 kBytes, value *kB50* corresponds to 50 kBytes and so on. *infinity* corresponds to an infinite amount of kBytes.

pollPDU

Parameter for RLC AM in TS 38.322 [4]. Value p4 corresponds to 4 PDUs, value p8 corresponds to 8 PDUs and so on. infinity corresponds to an infinite number of PDUs.

sn-FieldLength

Indicates the RLC SN field size, see TS 38.322 [4], in bits. Value *size6* means 6 bits, value *size12* means 12 bits, value *size18* means 18 bits. The value of *sn-FieldLength* of an RLC entity for the DRB/multicast MRB shall be changed only using reconfiguration with sync. The network configures only value *size12* in *SN-FieldLengthAM* for SRB.

t-PollRetransmit

Timer for RLC AM in TS 38.322 [4], in milliseconds. Value ms5 means 5 ms, value ms10 means 10 ms and so on.

t-Reassembly, t-ReassemblyExt

Timer for reassembly in TS 38.322 [4], in milliseconds. Value ms0 means 0 ms, value ms5 means 5 ms and so on. If t-ReassemblyExt-r17 is configured, the UE shall ignore t-Reassembly (without suffix).

t-StatusProhibit

Timer for status reporting in TS 38.322 [4], in milliseconds. Value *ms0* means 0 ms, value *ms5* means 5 ms and so on. If *t-StatusProhibit-v1610* is present, the UE shall ignore *t-StatusProhibit* (without suffix).

Conditional Presence	Explanation
Reestab	The field is mandatory present at RLC bearer setup. It is optionally present, need M, at RLC re-establishment. Otherwise it is
	absent. Need M.

RLF-TimersAndConstants

The IE *RLF-TimersAndConstants* is used to configure UE specific timers and constants.

RLF-TimersAndConstants information element

```
-- TAG-RLF-TIMERSANDCONSTANTS-START
RLF-TimersAndConstants ::=
                                    SEOUENCE {
                                        ENUMERATED {ms0, ms50, ms100, ms200, ms500, ms1000, ms2000, ms4000, ms6000},
    t.310
    n310
                                        ENUMERATED {n1, n2, n3, n4, n6, n8, n10, n20},
    n311
                                        ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10},
    . . . ,
    11
    t311
                                        ENUMERATED {ms1000, ms3000, ms5000, ms10000, ms15000, ms20000, ms30000}
    11
-- TAG-RLF-TIMERSANDCONSTANTS-STOP
-- ASN1STOP
```

RLF-TimersAndConstants field descriptions

n3xy

Constants are described in clause 7.3. Value n1 corresponds to 1, value n2 corresponds to 2 and so on.

t3xy

Timers are described in clause 7.1. Value ms0 corresponds to 0 ms, value ms50 corresponds to 50 ms and so on.

- RNTI-Value

The IE RNTI-Value represents a Radio Network Temporary Identity.

RNTI-Value information element

```
-- ASN1START
-- TAG-RNTI-VALUE-START

RNTI-Value ::= INTEGER (0..65535)

-- TAG-RNTI-VALUE-STOP
-- ASN1STOP
```

- RSRP-Range

The IE *RSRP-Range* specifies the value range used in RSRP measurements and thresholds. For measurements, integer value for RSRP measurements is according to Table 10.1.6.1-1 in TS 38.133 [14]. For thresholds, the actual value is (IE value – 156) dBm, except for the IE value 127, in which case the actual value is infinity.

RSRP-Range information element

```
-- ASN1START
-- TAG-RSRP-RANGE-START
```

```
RSRP-Range ::= INTEGER(0..127)

-- TAG-RSRP-RANGE-STOP

-- ASN1STOP
```

RSRQ-Range

The IE RSRQ-Range specifies the value range used in RSRQ measurements and thresholds. For measurements, integer value for RSRQ measurements is according to Table 10.1.11.1-1 in TS 38.133 [14]. For thresholds, the actual value is (IE value -87) / 2 dB.

RSRQ-Range information element

```
-- ASN1START
-- TAG-RSRQ-RANGE-START

RSRQ-Range ::= INTEGER(0..127)

-- TAG-RSRQ-RANGE-STOP
-- ASN1STOP
```

– RSSI-Range

The IE *RSSI-Range* specifies the value range used in RSSI measurements and thresholds for NR operation with shared spectrum channel access. The integer value for RSSI measurements is according to Table 10.1.34.3-1 in TS 38.133 [14].

RSSI-Range information element

```
-- ASN1START
-- TAG-RSSI-RANGE-START

RSSI-Range-r16 ::= INTEGER(0..76)

-- TAG-RSSI-RANGE-STOP
-- ASN1STOP
```

- RxTxTimeDiff

The IE *RxTxTimeDiff* contains the Rx-Tx time difference measurement at either the UE or the gNB.

RxTxTimeDiff information element

```
-- ASN1START
```

⁻⁻ TAG-RXTXTIMEDIFF-START

RxTxTimeDiff field descriptions

result-k5

This field indicates the Rx-Tx time difference measurement, see TS 38.215 [9], clause 10.1.25.3.1 of TS 38.133 [14] for UE Rx-Tx time difference and clause 13.2.1 of TS 38.133 [14] for gNB Rx-Tx time difference.

SCellActivationRS-Config

The IE *SCellActivationRS-Config* is used to configure a Reference Signal for fast activation of the SCell where the IE is included (see TS 38.214 [19], clause 5.2.1.5.3. Usage of an *SCellActivationRS-Config* is indicated by including its *scellActivationRS-Id* in the Enhanced SCell activation MAC CE (see TS 38.321 [3] clause 6.1.3.55).

SCellActivationRS-Config information element

OPTIONAL, -- Need R

SCellActivationRS-Config field descriptions

gapBetweenBursts

When this field is present, there are two bursts and it indicates the gap between the two bursts in number of slots. When this field is absent, there is a single burst.

gcl-Info

Reference to TCI-State for providing the QCL source and QCL type for each NZP-CSI-RS-Resource listed in nzp-CSI-RS-Resources of the NZP-CSI-RS-ResourceSet indicated by resourceSet (see TS 38.214 [19], clause 5.1.6.1.1.1). TCI-StateId refers to the TCI-State which has this value for tci-StateId and is defined in tci-StatesToAddModList in the PDSCH-Config included in the BWP-Downlink of this serving cell indicated by firstActiveDownlinkBWP-Id in the ServingCellConfig in which this IE is included.

resourceSet

nzp-CSI-ResourceSetId of the NZP-CSI-RS-ResourceSet of this serving cell used as resource configuration for one or two bursts for SCell activation. This NZP-CSI-RS-ResourceSet consists of four NZP CSI-RS resources in two consecutive slots with two NZP CSI-RS resources in each slot (see TS 38.214 [19], clause 5.1.6.1.1.1). The CSI-RS associated with this NZP-CSI-RS-ResourceSet are located in the BWP addressed by firstActiveDownlinkBWP-Id.

SCellActivationRS-Configld

The IE SCellActivationRS-ConfigId is used to identify one SCellActivationRS-Config.

SCellActivationRS-Configld information element

```
-- ASN1START
-- TAG-SCELLACTIVATIONRS-CONFIGID-START

SCellactivationRS-ConfigId-r17 ::= INTEGER (1.. maxNrofSCellactRS-r17)
-- TAG-SCELLACTIVATIONRS-CONFIGID-STOP
-- ASN1STOP
```

SCellIndex

The IE SCellIndex concerns a short identity, used to identify an SCell. The value range is shared across the Cell Groups.

SCellIndex information element

```
-- ASN1START
-- TAG-SCELLINDEX-START

SCellIndex ::= INTEGER (1..31)
-- TAG-SCELLINDEX-STOP
-- ASN1STOP
```

SchedulingRequestConfig

The IE SchedulingRequestConfig is used to configure the parameters, for the dedicated scheduling request (SR) resources.

SchedulingRequestConfig information element

```
-- ASN1START
-- TAG-SCHEDULINGREOUESTCONFIG-START
SchedulingRequestConfig ::=
                                    SEOUENCE {
    schedulingRequestToAddModList
                                        SEQUENCE (SIZE (1..maxNrofSR-ConfigPerCellGroup)) OF SchedulingRequestToAddMod
                                                                                                          OPTIONAL, -- Need N
    schedulingRequestToReleaseList
                                        SEQUENCE (SIZE (1..maxNrofSR-ConfigPerCellGroup)) OF SchedulingRequestId
                                                                                                          OPTIONAL -- Need N
SchedulingRequestToAddMod ::=
                                    SEOUENCE {
    schedulingRequestId
                                        SchedulingRequestId,
    sr-ProhibitTimer
                                        ENUMERATED {ms1, ms2, ms4, ms8, ms16, ms32, ms64, ms128}
                                                                                                          OPTIONAL, -- Need S
    sr-TransMax
                                        ENUMERATED { n4, n8, n16, n32, n64, spare3, spare2, spare1}
SchedulingRequestConfig-v1700 ::=
                                        SEOUENCE {
    schedulingRequestToAddModListExt-v1700 SEQUENCE (SIZE (1..maxNrofSR-ConfigPerCellGroup)) OF SchedulingRequestToAddModExt-v1700
                                                                                                          OPTIONAL -- Need N
SchedulingRequestToAddModExt-v1700 ::= SEQUENCE {
    sr-ProhibitTimer-v1700
                                           ENUMERATED { ms192, ms256, ms320, ms384, ms448, ms512, ms576, ms640, ms1082, spare7, spare6, spare5,
spare4, spare3, spare2, spare1}
                                                                                                          OPTIONAL -- Need R
-- TAG-SCHEDULINGREOUESTCONFIG-STOP
-- ASN1STOP
```

SchedulingRequestConfig field descriptions

schedulingRequestToAddModList, schedulingRequestToAddModListExt

List of Scheduling Request configurations to add or modify. If schedulingRequestToAddModListExt is configured, it contains the same number of entries, and in the same order, as schedulingRequestToAddModList.

schedulingRequestToReleaseList

List of Scheduling Request configurations to release.

SchedulingRequestToAddMod field descriptions

schedulingRequestId

Used to modify a SR configuration and to indicate, in *LogicalChannelConfig*, the SR configuration to which a logical channel is mapped and to indicate, in *SchedulingRequestresourceConfig*, the SR configuration for which a scheduling request resource is used.

sr-ProhibitTimer

Timer for SR transmission on PUCCH in TS 38.321 [3]. Value is in ms. Value ms1 corresponds to 1ms, value ms2 corresponds to 2ms, and so on. If sr-ProhibitTimer-v1700 is configured, UE shall ignore sr-ProhibitTimer (without suffix). If both sr-ProhibitTimer (without suffix) and sr-ProhibitTimer-v1700 are absent, the UE applies the value 0.

sr-TransMax

Maximum number of SR transmissions as described in TS 38.321 [3]. Value n4 corresponds to 4, value n8 corresponds to 8, and so on.

SchedulingRequestId

The IE SchedulingRequestId is used to identify a Scheduling Request instance in the MAC layer.

SchedulingRequestId information element

```
-- ASN1START
-- TAG-SCHEDULINGREQUESTID-START

SchedulingRequestId ::= INTEGER (0..7)

-- TAG-SCHEDULINGREQUESTID-STOP
-- ASN1STOP
```

SchedulingRequestResourceConfig

The IE *SchedulingRequestResourceConfig* determines physical layer resources on PUCCH where the UE may send the dedicated scheduling request (D-SR) (see TS 38.213 [13], clause 9.2.4).

SchedulingRequestResourceConfig information element

```
-- ASN1START
-- TAG-SCHEDULINGREOUESTRESOURCECONFIG-START
SchedulingRequestResourceConfig ::=
                                        SEQUENCE {
    schedulingRequestResourceId
                                            SchedulingRequestResourceId,
    schedulingRequestID
                                            SchedulingRequestId,
   periodicityAndOffset
                                            CHOICE {
       sym2
                                                NULL,
        symbor7
                                                NULL,
        sl1
                                                                             -- Recurs in every slot
                                                NULL,
        sl2
                                                INTEGER (0..1),
        sl4
                                                INTEGER (0..3),
        s15
                                                INTEGER (0..4),
        sl8
                                                INTEGER (0..7),
        s110
                                                INTEGER (0..9),
```

```
s116
                                                INTEGER (0..15),
       s120
                                                INTEGER (0..19),
       s140
                                                INTEGER (0..39),
       s180
                                                INTEGER (0..79),
       sl160
                                                INTEGER (0..159),
       s1320
                                                INTEGER (0..319),
       s1640
                                                INTEGER (0..639)
   resource
                                           PUCCH-ResourceId
SchedulingRequestResourceConfigExt-v1610 ::= SEQUENCE {
    phy-PriorityIndex-r16
                                                ENUMERATED {p0, p1}
SchedulingRequestResourceConfigExt-v1700 ::=
                                                SEQUENCE {
    periodicityAndOffset-r17
                                                    CHOICE {
       sl1280
                                                        INTEGER (0..1279),
       s12560
                                                        INTEGER (0..2559),
       s15120
                                                       INTEGER (0..5119)
-- TAG-SCHEDULINGREQUESTRESOURCECONFIG-STOP
-- ASN1STOP
```

```
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M
```

SchedulingRequestResourceConfig field descriptions

periodicityAndOffset

SR periodicity and offset in number of symbols or slots (see TS 38.213 [13], clause 9.2.4) The following periodicities may be configured depending on the chosen subcarrier spacing:

SCS = 15 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 5sl, 8sl, 10sl, 16sl, 20sl, 40sl, 80sl

SCS = 30 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 8sl, 10sl, 16sl, 20sl, 40sl, 80sl, 160sl

SCS = 60 kHz: 2sym, 7sym/6sym, 1sl, 2sl, 4sl, 8sl, 16sl, 20sl, 40sl, 80sl, 16osl, 320sl

SCS = 120 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 8sl, 16sl, 40sl, 80sl, 16osl, 320sl, 640sl

SCS = 480 kHz: 1sl, 2sl, 4sl, 8sl, 16sl, 40sl, 80sl, 160sl, 320sl, 640sl, 1280sl, 2560sl

SCS = 960 kHz: 1sl, 2sl, 4sl, 8sl, 16sl, 40sl, 80sl, 16osl, 320sl, 640sl, 1280sl, 2560sl, 5120sl

sym6or7 corresponds to 6 symbols if extended cyclic prefix and a SCS of 60 kHz are configured, otherwise it corresponds to 7 symbols.

For periodicities 2sym, 7sym and sl1 the UE assumes an offset of 0 slots.

If periodicityAndOffset-r17 is present, any previously configured periodicityAndOffset (without suffix) is released, and vice versa.

phy-PriorityIndex

Indicates whether this scheduling request resource is *high* or *low* priority in PHY prioritization/multiplexing handling (see TS 38.213 [13], clause 9.2.4). Value *p0* indicates low priority and value *p1* indicates high priority.

resource

ID of the PUCCH resource in which the UE shall send the scheduling request. The actual *PUCCH-Resource* is configured in *PUCCH-Config* of the same UL BWP and serving cell as this *SchedulingRequestResourceConfig*. The network configures a *PUCCH-Resource* of *PUCCH-format0* or *PUCCH-format1* (other formats not supported) (see TS 38.213 [13], clause 9.2.4)

schedulingRequestID

The ID of the SchedulingRequestConfig that uses this scheduling request resource.

SchedulingRequestResourceId

The IE Scheduling Request ResourceId is used to identify scheduling request resources on PUCCH.

SchedulingRequestResourceld information element

```
-- ASN1START
```

-- TAG-SCHEDULINGREOUESTRESOURCEID-START

SchedulingRequestResourceId ::= INTEGER (1..maxNrofSR-Resources)

- -- TAG-SCHEDULINGREOUESTRESOURCEID-STOP
- -- ASN1STOP

ScramblingId

The IE Scrambling ID is used for scrambling channels and reference signals.

ScramblingId information element

```
-- ASN1START
-- TAG-SCRAMBLINGID-START

ScramblingId ::= INTEGER(0..1023)

-- TAG-SCRAMBLINGID-STOP
-- ASN1STOP
```

SCS-SpecificCarrier

The IE SCS-Specific Carrier provides parameters determining the location and width of the actual carrier or the carrier bandwidth. It is defined specifically for a numerology (subcarrier spacing (SCS)) and in relation (frequency offset) to Point A.

SCS-SpecificCarrier information element

```
-- ASN1START
-- TAG-SCS-SPECIFICCARRIER-START
SCS-SpecificCarrier ::= SEQUENCE {
   offsetToCarrier
subcarrierSpacing
carrierBandwidth
                                       INTEGER (0..2199),
                                        SubcarrierSpacing,
                                       INTEGER (1..maxNrofPhysicalResourceBlocks),
    . . . ,
    [ [
    txDirectCurrentLocation
                              INTEGER (0..4095)
                                                                                            OPTIONAL
                                                                                                                -- Need S
    ]]
-- TAG-SCS-SPECIFICCARRIER-STOP
-- ASN1STOP
```

SCS-SpecificCarrier field descriptions

carrierBandwidth

Width of this carrier in number of PRBs (using the subcarrierSpacing defined for this carrier) (see TS 38.211 [16], clause 4.4.2).

offsetToCarrier

Offset in frequency domain between Point A (lowest subcarrier of common RB 0) and the lowest usable subcarrier on this carrier in number of PRBs (using the subcarrierSpacing defined for this carrier). The maximum value corresponds to 275*8-1. See TS 38.211 [16], clause 4.4.2.

txDirectCurrentLocation

Indicates the downlink Tx Direct Current location for the carrier. A value in the range 0..3299 indicates the subcarrier index within the carrier. The values in the value range 3301..4095 are reserved and ignored by the UE. If this field is absent for downlink within *ServingCellConfigCommon* and *ServingCellConfigCommonSIB*, the UE assumes the default value of 3300 (i.e. "Outside the carrier"). (see TS 38.211 [16], clause 4.4.2). Network does not configure this field via *ServingCellConfig* or for uplink carriers.

subcarrierSpacing

Subcarrier spacing of this carrier. It is used to convert the offsetToCarrier into an actual frequency.

Only the following values are applicable depending on the used frequency:

FR1: 15 or 30 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

SDAP-Config

The IE SDAP-Config is used to set the configurable SDAP parameters for a data radio bearer. All configured instances of SDAP-Config with the same value of pdu-Session correspond to the same SDAP entity as specified in TS 37.324 [24].

SDAP-Config information element

```
-- ASN1START
-- TAG-SDAP-CONFIG-START
SDAP-Config ::=
                                    SEOUENCE {
    pdu-Session
                                        PDU-SessionID,
    sdap-HeaderDL
                                        ENUMERATED {present, absent},
    sdap-HeaderUL
                                        ENUMERATED {present, absent},
    defaultDRB
                                        BOOLEAN,
   mappedOoS-FlowsToAdd
                                        SEQUENCE (SIZE (1..maxNrofQFIs)) OF QFI
                                                                                                                 OPTIONAL, -- Need N
                                        SEQUENCE (SIZE (1..maxNrofOFIs)) OF OFI
                                                                                                                 OPTIONAL, -- Need N
   mappedQoS-FlowsToRelease
OFI ::=
                                    INTEGER (0..maxQFI)
PDU-SessionID ::=
                                    INTEGER (0..255)
-- TAG-SDAP-CONFIG-STOP
-- ASN1STOP
```

SDAP-Config field descriptions

defaultDRB

Indicates whether or not this is the default DRB for this PDU session. Among all configured instances of SDAP-Config with the same value of pdu-Session, this field shall be set to true in at most one instance of SDAP-Config and to false in all other instances.

mappedQoS-FlowsToAdd

Indicates the list of QFIs of UL QoS flows of the PDU session to be additionally mapped to this DRB. A QFI value can be included at most once in all configured instances of SDAP-Config with the same value of pdu-Session. For QoS flow remapping, the QFI value of the remapped QoS flow is only included in mappedQoS-FlowsToAdd in sdap-Config corresponding to the new DRB and not included in mappedQoS-FlowsToRelease in sdap-Config corresponding to the old DRB.

mappedQoS-FlowsToRelease

Indicates the list of QFIs of QoS flows of the PDU session to be released from existing QoS flow to DRB mapping of this DRB.

pdu-Session

Identity of the PDU session whose QoS flows are mapped to the DRB.

sdap-HeaderUL

Indicates whether or not a SDAP header is present for UL data on this DRB. The field cannot be changed after a DRB is established. The network sets this field to present if the field defaultDRB is set to true.

sdap-HeaderDL

Indicates whether or not a SDAP header is present for DL data on this DRB. The field cannot be changed after a DRB is established.

SearchSpace

The IE SearchSpace defines how/where to search for PDCCH candidates. Each search space is associated with one ControlResourceSet. For a scheduled SCell in the case of cross carrier scheduling, except for nrofCandidates, all the optional fields are absent (regardless of their presence conditions). For a scheduled SpCell in the case of the cross carrier scheduling, if the search space is linked to another search space in the scheduling SCell, all the optional fields of this search space in the scheduled SpCell are absent (regardless of their presence conditions) except for nrofCandidates.

SearchSpace information element

```
-- ASN1START
-- TAG-SEARCHSPACE-START
SearchSpace ::=
                                        SEQUENCE {
    searchSpaceId
                                            SearchSpaceId,
    controlResourceSetId
                                            ControlResourceSetId
                                                                                                          OPTIONAL, -- Cond SetupOnly
    monitoringSlotPeriodicityAndOffset
                                            CHOICE {
        sl1
                                                 NULL.
        s12
                                                 INTEGER (0..1),
        s14
                                                 INTEGER (0..3),
        s15
                                                 INTEGER (0..4),
        sl8
                                                 INTEGER (0..7),
        s110
                                                 INTEGER (0..9),
        s116
                                                 INTEGER (0..15),
        s120
                                                 INTEGER (0..19),
        s140
                                                 INTEGER (0..39),
        s180
                                                 INTEGER (0..79),
        s1160
                                                 INTEGER (0..159),
        s1320
                                                 INTEGER (0..319),
        s1640
                                                 INTEGER (0..639),
```

```
s11280
                                                INTEGER (0..1279),
        s12560
                                                INTEGER (0..2559)
                                                                                                          OPTIONAL.
                                                                                                                      -- Cond Setup4
    duration
                                            INTEGER (2..2559)
                                                                                                          OPTIONAL,
                                                                                                                     -- Need S
    monitoringSymbolsWithinSlot
                                            BIT STRING (SIZE (14))
                                                                                                          OPTIONAL.
                                                                                                                     -- Cond Setup
    nrofCandidates
                                            SEQUENCE {
        aggregationLevel1
                                                ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8},
        aggregationLevel2
                                                ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8},
        aggregationLevel4
                                                ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8},
        aggregationLevel8
                                                ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8},
        aggregationLevel16
                                                ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8}
                                                                                                          OPTIONAL,
                                                                                                                    -- Cond Setup
                                            CHOICE {
    searchSpaceType
        common
                                                SEQUENCE {
            dci-Format0-0-AndFormat1-0
                                                     SEOUENCE {
                                                                                                          OPTIONAL,
                                                                                                                     -- Need R
           dci-Format2-0
                                                     SEOUENCE {
                nrofCandidates-SFI
                                                         SEOUENCE -
                    aggregationLevel1
                                                             ENUMERATED {n1, n2}
                                                                                                          OPTIONAL,
                                                                                                                      -- Need R
                                                             ENUMERATED {n1, n2}
                    aggregationLevel2
                                                                                                          OPTIONAL,
                                                                                                                     -- Need R
                                                             ENUMERATED {n1, n2}
                    aggregationLevel4
                                                                                                          OPTIONAL,
                                                                                                                     -- Need R
                                                             ENUMERATED {n1, n2}
                    aggregationLevel8
                                                                                                          OPTIONAL,
                                                                                                                     -- Need R
                                                             ENUMERATED {n1, n2}
                    aggregationLevel16
                                                                                                          OPTIONAL
                                                                                                                      -- Need R
                . . .
                                                                                                          OPTIONAL,
                                                                                                                     -- Need R
            dci-Format2-1
                                                     SEOUENCE {
                . . .
                                                                                                          OPTIONAL,
                                                                                                                     -- Need R
            dci-Format2-2
                                                     SEQUENCE {
                                                                                                          OPTIONAL,
                                                                                                                     -- Need R
                                                     SEQUENCE {
            dci-Format2-3
                dummv1
                                                         ENUMERATED {sl1, sl2, sl4, sl5, sl8, sl10, sl16, sl20} OPTIONAL, -- Cond Setup
                dummy2
                                                         ENUMERATED {n1, n2},
                                                                                                          OPTIONAL
                                                                                                                      -- Need R
       ue-Specific
                                                     SEOUENCE {
           dci-Formats
                                                         ENUMERATED {formats0-0-And-1-0, formats0-1-And-1-1},
            . . . ,
           [[
            dci-Formats-MT-r16
                                                  ENUMERATED {formats2-5}
                                                                                                          OPTIONAL,
            dci-FormatsSL-r16
                                                  ENUMERATED {formats0-0-And-1-0, formats0-1-And-1-1, formats3-0, formats3-1,
                                                              formats3-0-And-3-1}
                                                                                                          OPTIONAL,
                                                                                                                       -- Need R
                                                  ENUMERATED {formats0-2-And-1-2, formats0-1-And-1-1And-0-2-And-1-2}
           dci-FormatsExt-r16
                                                                                                          OPTIONAL
                                                                                                                       -- Need R
           ]]
                                                                                                          OPTIONAL
                                                                                                                      -- Cond Setup2
SearchSpaceExt-r16 ::=
                                         SEQUENCE {
```

```
controlResourceSetId-r16
                                            ControlResourceSetId-r16
                                                                                                                    -- Cond SetupOnly2
                                                                                                         OPTIONAL,
    searchSpaceType-r16
                                            SEOUENCE {
        common-r16
                                                SEOUENCE {
            dci-Format2-4-r16
                                                    SEOUENCE {
                nrofCandidates-CI-r16
                                                        SEQUENCE
                                                            ENUMERATED {n1, n2}
                    aggregationLevel1-r16
                                                                                                         OPTIONAL,
                                                                                                                     -- Need R
                    aggregationLevel2-r16
                                                            ENUMERATED {n1, n2}
                                                                                                         OPTIONAL,
                                                                                                                    -- Need R
                                                            ENUMERATED {n1, n2}
                    aggregationLevel4-r16
                                                                                                         OPTIONAL,
                                                                                                                    -- Need R
                    aggregationLevel8-r16
                                                             ENUMERATED {n1, n2}
                                                                                                         OPTIONAL,
                                                                                                                    -- Need R
                                                            ENUMERATED {n1, n2}
                                                                                                                     -- Need R
                    aggregationLevel16-r16
                                                                                                         OPTIONAL
                . . .
                                                                                                         OPTIONAL,
                                                                                                                    -- Need R
            dci-Format2-5-r16
                                                   SEOUENCE {
                nrofCandidates-IAB-r16
                                                        SEOUENCE {
                                                                                                                     -- Need R
                    aggregationLevel1-r16
                                                            ENUMERATED {n1, n2}
                                                                                                         OPTIONAL,
                                                            ENUMERATED {n1, n2}
                                                                                                                     -- Need R
                    aggregationLevel2-r16
                                                                                                         OPTIONAL,
                                                            ENUMERATED {n1, n2}
                    aggregationLevel4-r16
                                                                                                         OPTIONAL,
                                                                                                                    -- Need R
                                                            ENUMERATED {n1, n2}
                    aggregationLevel8-r16
                                                                                                         OPTIONAL,
                                                                                                                    -- Need R
                                                            ENUMERATED {n1, n2}
                                                                                                                     -- Need R
                    aggregationLevel16-r16
                                                                                                         OPTIONAL
                . . .
                                                                                                         OPTIONAL,
                                                                                                                    -- Need R
                                                    SEOUENCE {
            dci-Format2-6-r16
                                                                                                         OPTIONAL,
                                                                                                                     -- Need R
            . . .
                                                                                                         OPTIONAL,
                                                                                                                      -- Cond Setup3
                                                    SEQUENCE (SIZE (1.. 2)) OF INTEGER (0..1)
    searchSpaceGroupIdList-r16
                                                                                                                      -- Need R
                                                                                                         OPTIONAL,
    freqMonitorLocations-r16
                                                    BIT STRING (SIZE (5))
                                                                                                         OPTIONAL
                                                                                                                      -- Need R
SearchSpaceExt-v1700 ::=
                                    SEQUENCE {
    monitoringSlotPeriodicityAndOffset-v1710 CHOICE {
       s132
                                                 INTEGER (0..31),
        s164
                                                 INTEGER (0..63),
        s1128
                                                 INTEGER (0..127),
        s15120
                                                 INTEGER (0..5119),
        s110240
                                                 INTEGER (0..10239),
                                                 INTEGER (0..20479)
        s120480
                                                                                                         OPTIONAL,
                                                                                                                    -- Cond Setup5
    monitoringSlotsWithinSlotGroup-r17
                                             CHOICE {
        slotGroupLength4-r17
                                                 BIT STRING (SIZE (4)),
        slotGroupLength8-r17
                                                 BIT STRING (SIZE (8))
                                                                                                         OPTIONAL, -- Need R
    duration-r17
                                             INTEGER (4..20476)
                                                                                                         OPTIONAL, -- Need R
                                    SEQUENCE {
    searchSpaceType-r17
                                        SEOUENCE {
        common-r17
            dci-Format4-0-r17
                                            SEQUENCE {
                                                                                                         OPTIONAL, -- Need R
            dci-Format4-1-r17
                                            SEQUENCE {
```

```
OPTIONAL,
                                                                                                              -- Need R
       dci-Format4-2-r17
                                       SEOUENCE {
                                                                                                   OPTIONAL,
                                                                                                              -- Need R
       dci-Format4-1-AndFormat4-2-r17 SEQUENCE {
                                                                                                   OPTIONAL,
                                                                                                             -- Need R
       dci-Format2-7-r17
                                       SEQUENCE {
           nrofCandidates-PEI-r17
                                           SEQUENCE {
               aggregationLevel4-r17
                                           ENUMERATED {n0, n1, n2, n3, n4}
                                                                                                  OPTIONAL,
                                                                                                              -- Need R
                                           ENUMERATED {n0, n1, n2}
               aggregationLevel8-r17
                                                                                                              -- Need R
                                                                                                  OPTIONAL,
                                           ENUMERATED {n0, n1}
                                                                                                              -- Need R
               aggregationLevel16-r17
                                                                                                   OPTIONAL
           },
                                                                                                   OPTIONAL
                                                                                                              -- Need R
                                                                                                   OPTIONAL,
                                                                                                              -- Need R
searchSpaceGroupIdList-r17
                                   SEQUENCE (SIZE (1.. 3)) OF INTEGER (0.. maxNrofSearchSpaceGroups-1-r17) OPTIONAL, -- Cond DedicatedOnly
                                                                                                            -- Cond DedicatedOnly
searchSpaceLinkingId-r17
                                   INTEGER (0..maxNrofSearchSpacesLinks-1-r17)
                                                                                                   OPTIONAL
```

⁻⁻ ASN1STOP

SearchSpace field descriptions

common

Configures this search space as common search space (CSS) and DCI formats to monitor.

controlResourceSetId

The CORESET applicable for this SearchSpace. Value 0 identifies the common CORESET#0 configured in MIB and in ServingCellConfigCommon. Values 1..maxNrofControlResourceSets-1 identify CORESETs configured in System Information or by dedicated signalling. The CORESETs with non-zero controlResourceSetId are configured in the same BWP as this SearchSpace except commonControlResourceSetExt which is configured by SIB20. If the field controlResourceSetId-r16 is present, UE shall ignore the controlResourceSetId (without suffix).

dummy1, dummy2

This field is not used in the specification. If received it shall be ignored by the UE.

dci-Format0-0-AndFormat1-0

If configured, the UE monitors the DCI formats 0_0 and 1_0 according to TS 38.213 [13], clause 10.1.

dci-Format2-0

If configured, UE monitors the DCI format 2_0 according to TS 38.213 [13], clause 10.1, 11.1.1.

dci-Format2-1

If configured, UE monitors the DCI format 2_1 according to TS 38.213 [13], clause 10.1, 11.2.

dci-Format2-2

If configured, UE monitors the DCI format 2_2 according to TS 38.213 [13], clause 10.1, 11.3.

dci-Format2-3

If configured, UE monitors the DCI format 2_3 according to TS 38.213 [13], clause 10.1, 11.4

dci-Format2-4

If configured, UE monitors the DCI format 2 4 according to TS 38.213 [13], clause 11.2A.

dci-Format2-5

If configured, IAB-MT monitors the DCI format 2_5 according to TS 38.213 [13], clause 14.

dci-Format2-6

If configured, UE monitors the DCI format 2_6 according to TS 38.213 [13], clause 10.1, 10.3. DCI format 2_6 can only be configured on the SpCell.

dci-Format2-7

If configured, UE monitors the DCI format 2 7 according to TS 38.213 [13], clause 10.1, 10.4A.

dci-Format4-0

If configured, the UE monitors the DCI format 4_0 with CRC scrambled by MCCH-RNTI/G-RNTI according to TS 38.213 [13], clause [10.1].

dci-Format4-1-AndFormat4-2

If configured, the UE monitors the DCI format 4_1 and 4_2 with CRC scrambled by G-RNTI/G-CS-RNTI according to TS 38.213 [13], clause [11.1].

dci-Format4-1

If configured, the UE monitors the DCI format 4 1 with CRC scrambled by G-RNTI/G-CS-RNTI according to TS 38.213 [13], clause [10.1].

dci-Format4-2

If configured, the UE monitors the DCI format 4 2 with CRC scrambled by G-RNTI/G-CS-RNTI according to TS 38.213 [13], clause [10.1].

dci-Formats

Indicates whether the UE monitors in this USS for DCI formats 0-0 and 1-0 or for formats 0-1 and 1-1.

dci-FormatsExt

If this field is present, the field *dci-Formats* is ignored and *dci-FormatsExt* is used instead to indicate whether the UE monitors in this USS for DCI format 0_2 and 1_2 or formats 0_1 and 1_1 and 0_2 and 1_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 10.1). This field is not configured for operation with shared spectrum channel access in this release.

dci-Formats-MT

Indicates whether the IAB-MT monitors the DCI formats 2-5 according to TS 38.213 [13], clause 14.

dci-FormatsSL

Indicates whether the UE monitors in this USS for DCI formats 0-0 and 1-0 or for formats 0-1 and 1-1 or for format 3-0 or for format 3-1 or for formats 3-0 and 3-1. If this field is present, the field *dci-Formats* is ignored and *dci-FormatsSL* is used.

duration

Number of consecutive slots that a SearchSpace lasts in every occasion, i.e., upon every period as given in the *periodicityAndOffset*. If the field is absent, the UE applies the value 1 slot, except for DCI format 2_0. The UE ignores this field for DCI format 2_0. The maximum valid duration is periodicity-1 (periodicity as given in the *monitoringSlotPeriodicityAndOffset*).

For SCS 480 kHz and SCS 960 kHz, duration-r17 is used, and the configured duration is restricted to be an integer multiple of L slots and smaller than periodicity, where L is the configured length of the bitmap *monitoringSlotsWithinSlotGroup-r17*. If *duration-r17* is absent, the UE assumes the duration in slots is equal to L. The maximum valid duration is periodicity-L.

For IAB-MT, duration indicates number of consecutive slots that a SearchSpace lasts in every occasion, i.e., upon every period as given in the *periodicityAndOffset*. If the field is absent, the IAB-MT applies the value 1 slot, except for DCI format 2_0 and DCI format 2_5. The IAB-MT ignores this field for DCI format 2_0 and DCI format 2_5. The maximum valid duration is periodicity-1 (periodicity as given in the *monitoringSlotPeriodicityAndOffset*).

freqMonitorLocations

Defines an association of the search space to multiple monitoring locations in the frequency domain and indicates whether the pattern configured in the associated CORESET is replicated to a specific RB set, see TS 38.213, clause 10.1. Each bit in the bitmap corresponds to one RB set, and the leftmost (most significant) bit corresponds to RB set 0 in the BWP. A bit set to 1 indicates that a frequency domain resource allocation replicated from the pattern configured in the associated CORESET is mapped to the RB set.

monitoringSlotPeriodicityAndOffset

Slots for PDCCH Monitoring configured as periodicity and offset.

For SCS 15, 30, 60, and 120 kHz and if the UE is configured to monitor:

- DCI format 2 1, only the values 'sl1', 'sl2' or 'sl4' are applicable.
- DCI format 2_0, only the values 'sl1', 'sl2', 'sl4', 'sl5', 'sl8', 'sl10', 'sl16', and 'sl20' are applicable (see TS 38.213 [13], clause 10).
- DCI format 2 4, only the values 'sl1', 'sl2', 'sl4', 'sl5', 'sl8' and 'sl10' are applicable.

For SCS 480 kHz and if the UE is configured to monitor:

- DCI format 2 0, only the values 'sl4', 'sl8', 'sl16', 'sl20', 'sl32', 'sl40', 'sl64', and 'sl80' are applicable.
- DCI format 2 1, only the values 'sl4', 'sl8', and 'sl16' are applicable.
- DCI format 2 4. only the values 'sl4', 'sl8', 'sl16', 'sl20', 'sl32', 'sl40' are applicable.

For SCS 960 kHz and if the UE is configured to monitor:

- DCI format 2 0, only the values 'sl4', 'sl8', 'sl16', 'sl20', 'sl32', 'sl40', 'sl64', and 'sl80' are applicable.
- DCI format 2_1, only the values 'sl4', 'sl8', and 'sl16' are applicable.
- DCI format 2_4, only the values 'sl8', 'sl16', 'sl32', 'sl40', 'sl64', 'sl80' are applicable.

For SCS 480 kHz and SCS 960 kHz, and the configured periodicity and offset are restricted to be an integer multiple of L slots, where L is the configured length of the bitmap provided by *monitoringSlotsWithinSlotGroup-r17*, i.e. for a given periodicity, the offset has a range of {0, L, 2*L, ..., L*FLOOR(1/L*(periodicity-1))}.

For IAB-MT, If the IAB-MT is configured to monitor DCI format 2_1, only the values 'sl1', 'sl2' or 'sl4' are applicable. If the IAB-MT is configured to monitor DCI format 2_0 or DCI format 2_5, only the values 'sl1', 'sl2', 'sl4', 'sl5', 'sl10', 'sl10', 'and 'sl20' are applicable (see TS 38.213, clause 10).

If monitoringSlotPeriodicityAndOffset-r17 is present, any previously configured monitoringSlotPeriodicityAndOffset is released, and if monitoringSlotPeriodicityAndOffset is present, any previously configured monitoringSlotPeriodicityAndOffset-r17 is released.

monitoringSlotsWithinSlotGroup

Indicates which slot(s) within a slot group are configured for multi-slot PDCCH monitoring. The first (leftmost, most significant) bit represents the first slot in the slot group, the second bit represents the second slot in the slot group, and so on. A bit set to '1' indicates that the corresponding slot is configured for multi-slot PDCCH monitoring (see TS 38.213 [13], clause 10). The number of slots for multi-slot PDCCH monitoring is configured according to clause 10 in TS 38.213 [13].

monitoringSymbolsWithinSlot

The first symbol(s) for PDCCH monitoring in the slots configured for (multi-slot) PDCCH monitoring (see *monitoringSlotPeriodicityAndOffset* and *duration*). The most significant (left) bit represents the first OFDM in a slot, and the second most significant (left) bit represents the second OFDM symbol in a slot and so on. The bit(s) set to one identify the first OFDM symbol(s) of the control resource set within a slot. If the cyclic prefix of the BWP is set to extended CP, the last two bits within the bit string shall be ignored by the UE or IAB-MT.

For DCI format 2_0, the first one symbol applies if the *duration* of CORESET (in the IE *ControlResourceSet)* identified by *controlResourceSetId* indicates 3 symbols, the first two symbols apply if the *duration* of CORESET identified by *controlResourceSetId* indicates 2 symbols, and the first three symbols apply if the *duration* of CORESET identified by *controlResourceSetId* indicates 1 symbol.

See TS 38.213 [13], clause 10.

See TS 38.213 [13], clause 10.

For IAB-MT: For DCI format 2_0 or DCI format 2_5, the first one symbol applies if the duration of CORESET (in the IE *ControlResourceSetl*) identified by *controlResourceSetld* indicates 3 symbols, the first two symbols apply if the *duration* of CORESET identified by *controlResourceSetld* indicates 2 symbols, and the first three symbols apply if the *duration* of CORESET identified by *controlResourceSetld* indicates 1 symbol.

nrofCandidates-Cl

The number of PDCCH candidates specifically for format 2-4 for the configured aggregation level. If an aggregation level is absent, the UE does not search for any candidates with that aggregation level. The network configures only one aggregationLevel and the corresponding number of candidates (see TS 38.213 [13], clause 10.1).

nrofCandidates-PEI

The number of PDCCH candidates specifically for format 2-7 for the configured aggregation level.

nrofCandidates-SFI

The number of PDCCH candidates specifically for format 2-0 for the configured aggregation level. If an aggregation level is absent, the UE does not search for any candidates with that aggregation level. The network configures only one aggregationLevel and the corresponding number of candidates (see TS 38.213 [13], clause 11.1.1). For a search space configured with *freqMonitorLocations-r16*, only value 'n1' is valid.

nrofCandidates

Number of PDCCH candidates per aggregation level. The number of candidates and aggregation levels configured here applies to all formats unless a particular value is specified or a format-specific value is provided (see inside searchSpaceType). If configured in the SearchSpace of a cross carrier scheduled cell, this field determines the number of candidates and aggregation levels to be used on the linked scheduling cell (see TS 38.213 [13], clause 10).

searchSpaceGroupIdList-r16, searchSpaceGroupIdList-r17

List of search space group IDs which the search space is associated with. The network configures at most 2 search space groups per BWP where the group ID is either 0 or 1 if searchSpaceGroupIdList-r16 is included. The network configures at most 3 search space groups per BWP where the group ID is either 0, 1 or 2 if searchSpaceGroupIdList-r17 is included. And if searchSpaceGroupIdList-r17 is included, searchSpaceGroupIdList-r16 is ignored.

searchSpaceId

Identity of the search space. SearchSpaceId = 0 identifies the searchSpaceZero configured via PBCH (MIB) or ServingCellConfigCommon and may hence not be used in the SearchSpace IE. The searchSpaceId is unique among the BWPs of a Serving Cell. In case of cross carrier scheduling, search spaces with the same searchSpaceId in scheduled cell and scheduling cell are linked to each other. The UE applies the search space for the scheduled cell only if the DL BWPs in which the linked search spaces are configured in scheduling cell and scheduled cell are both active.

For an IAB-MT, the search space defines how/where to search for PDCCH candidates for an IAB-MT where each search space is associated with one ControlResearchSet and for a scheduled cell in the case of cross carrier scheduling, except for nrofCandidates, all the optional fields are absent.

SearchSpaceLinkingId

This parameter is used to link two search spaces of same type in the same BWP. If two search spaces have the same SearchSpaceLinkingId UE assumes these search spaces are linked to PDCCH repetition REF. When PDCCH repetition is monitored in two linked search space (SS) sets, the UE does not expect a third monitored SS set to be linked with any of the two linked SS sets. The two linked SS sets have the same SS set type (USS/CSS). The two linked SS sets have the same DCI formats to monitor. For intra-slot PDCCH repetition: The two SS sets should have the same periodicity and offset (monitoringSlotPeriodicityAndOffset), and the same duration. For linking monitoring occasions across the two SS sets that exist in the same slot: The two SS sets have the same number of monitoring occasions within a slot and n-th monitoring occasion of one SS set is linked to n-th monitoring occasion of the other SS set. The following SS sets cannot be linked with another SS set for PDCCH repetition: SS set 0, searchSpaceSIB1, searchSpaceOtherSystemInformation, pagingSearchSpace, ra-SearchSpace, searchSpaceMCCH, searchSpaceMTCH, peiSearchSpace, and sdt-SearchSpace. SS set configured by recoverySearchSpaceId cannot be linked to another SS set for PDCCH repetition. When a scheduled serving cell is configured to be cross-carrier scheduled by a scheduling serving cell, two PDCCH candidates (with the same AL and candidate index associated with the scheduled serving cell) are linked only if the corresponding two SS sets in the scheduling serving cell are linked and two SS sets in the scheduled serving format 3-1 or for monitoring formats 3-0 and format 3-1.

searchSpaceTvpe

Indicates whether this is a common search space (present) or a UE specific search space as well as DCI formats to monitor for.

ue-Specific

Configures this search space as UE specific search space (USS). The UE monitors the DCI format with CRC scrambled by C-RNTI, CS-RNTI (if configured), and SP-CSI-RNTI (if configured)

Conditional Presence	Explanation
DedicatedOnly	In PDCCH-Config, the field is optionally present, Need R. Otherwise it is absent, Need R.
Setup	This field is mandatory present upon creation of a new SearchSpace. It is optionally present, Need M, otherwise.
Setup2	This field is mandatory present when a new SearchSpace is set up, if the same SearchSpace ID is not included in searchSpacesToAddModListExt-r16 of the parent IE with the field searchSpaceType-r16 or searchSpaceType-r17 included. Otherwise it is optionally present, Need M.
Setup3	This field is mandatory present when a new SearchSpace is set up, if the same SearchSpace ID is not included in searchSpacesToAddModListExt (without suffix) of the parent IE with the field searchSpaceType (without suffix) included. Otherwise it is optionally present, Need M.
Setup4	This field is mandatory present upon creation of a new SearchSpace if monitoringSlotPeriodicityAndOffset-r17 is not included. It is optionally present, Need M, otherwise.
Setup5	This field is mandatory present upon creation of a new SearchSpace if monitoringSlotPeriodicityAndOffset (without suffix) is not included. It is optionally present, Need M, otherwise.
SetupOnly	This field is mandatory present upon creation of a new SearchSpace. It is absent, Need M, otherwise.
SetupOnly2	In PDCCH-Config, the field is optionally present upon creation of a new SearchSpace and absent, Need M upon reconfiguration of an existing SearchSpace. In PDCCH-ConfigCommon, the field is absent.

SearchSpaceId

The IE SearchSpaceId is used to identify Search Spaces. The ID space is used across the BWPs of a Serving Cell. The search space with the SearchSpaceId = 0 identifies the search space configured via PBCH (MIB) and in ServingCellConfigCommon (searchSpaceZero). The number of Search Spaces per BWP is limited to 10 including the common and UE specific Search Spaces.

SearchSpaceId information element

```
-- ASN1START
-- TAG-SEARCHSPACEID-START

SearchSpaceId ::= INTEGER (0..maxNrofSearchSpaces-1)
-- TAG-SEARCHSPACEID-STOP
-- ASN1STOP
```

SearchSpaceZero

The IE SearchSpaceZero is used to configure SearchSpace#0 of the initial BWP (see TS 38.213 [13], clause 13).

SearchSpaceZero information element

```
-- ASN1START
-- TAG-SEARCHSPACEZERO-START

SearchSpaceZero ::= INTEGER (0..15)

-- TAG-SEARCHSPACEZERO-STOP
-- ASN1STOP
```

SecurityAlgorithmConfig

The IE SecurityAlgorithmConfig is used to configure AS integrity protection algorithm and AS ciphering algorithm for SRBs and DRBs.

SecurityAlgorithmConfig information element

```
-- ASN1START
-- TAG-SECURITYALGORITHMCONFIG-START
SecurityAlgorithmConfig ::=
    arityAlgorithmConfig ::= SE(
cipheringAlgorithm
integrityProtAlgorithm
                                      SEQUENCE {
                                           CipheringAlgorithm,
                                           IntegrityProtAlgorithm
    integrityProtAlgorithm
                                                                             OPTIONAL, -- Need R
IntegrityProtAlgorithm ::=
                                      ENUMERATED
                                           nia0, nia1, nia2, nia3, spare4, spare3,
                                           spare2, spare1, ...}
CipheringAlgorithm ::=
                                      ENUMERATED {
                                           nea0, nea1, nea2, nea3, spare4, spare3,
                                           spare2, spare1, ...}
```

-- TAG-SECURITYALGORITHMCONFIG-STOP
-- ASN1STOP

SecurityAlgorithmConfig field descriptions

cipheringAlgorithm

Indicates the ciphering algorithm to be used for SRBs and DRBs, as specified in TS 33.501 [11]. The algorithms *nea0-nea3* are identical to the LTE algorithms eea0-3. The algorithms configured for all bearers using master key shall be the same, and the algorithms configured for all bearers using secondary key, if any, shall be the same. If UE is connected to E-UTRA/EPC, this field indicates the ciphering algorithm to be used for RBs configured with NR PDCP, as specified in TS 33.501 [11].

integrityProtAlgorithm

Indicates the integrity protection algorithm to be used for SRBs and DRBs, as specified in TS 33.501 [11]. The algorithms *nia0-nia3* are identical to the E-UTRA algorithms *eia0-3*. The algorithms configured for all bearers using master key shall be the same and the algorithms configured for all bearers using secondary key, if any, shall be the same. The network does not configure *nia0* except for unauthenticated emergency sessions for unauthenticated UEs in LSM (limited service mode).

If UE is connected to E-UTRA/EPC, this field indicates the integrity protection algorithm to be used for SRBs configured with NR PDCP as specified in TS 33.501 [11], and DRBs configured with integrity protection as specified in TS 33.401 [30]. The network does not configure *nia0* for SRB3.

SemiStaticChannelAccessConfig

The IE SemiStaticChannelAccessConfig is used to configure channel access parameters when the network is operating in semi-static channel access mode (see clause 4.3 TS 37.213 [48].

SemiStaticChannelAccessConfig information element

SemiStaticChannelAccessConfig field descriptions

period

Indicates the periodicity of the semi-static channel access mode (see TS 37.213 [48], clause 4.3). Value ms1 corresponds to 1 ms, value ms2 corresponds to 2 ms, value ms2dot5 corresponds to 2.5 ms, and so on.

SemiStaticChannelAccessConfigUE

The IE SemiStatic Channel Access ConfigUE is used to configure channel access parameters for UE initiated semi-static channel access.

SemiStaticChannelAccessConfigUE information element

SemiStaticChannelAccessConfigUE field descriptions

periodUE

Indicates the period of a channel occupancy that the UE can initiate as described in TS 37.213 [48], clause 4.3. Value ms1 corresponds to 1 ms, value ms2 corresponds to 2 ms, value ms2dot5 corresponds to 2.5 ms, and so on.

offsetUE

Indicates the number of symbols from the beginning of the even indexed radio frame to the start of the first period within that radio frame that the UE can initiate a channel occupancy (see TS 37.213 [48], clause 4.3), based on the smallest SCS among the configured SCSs in the serving cell. The offset duration indicated by this field is less than the period duration indicated by *periodUE*. The maximum value is 139, 279 and 559 for 15, 30 and 60 kHz subcarrier spacing, respectively.

Sensor-LocationInfo

The IE Sensor-LocationInfo is used by the UE to provide sensor information.

Sensor-LocationInfo information element

```
-- ASN1START
-- TAG-SENSORLOCATIONINFO-START

Sensor-LocationInfo-r16 ::= SEQUENCE {
    sensor-MeasurementInformation-r16 OCTET STRING OPTIONAL,
    sensor-MotionInformation-r16 OCTET STRING OPTIONAL,
    ...
}

-- TAG-SENSORLOCATIONINFO-STOP
-- ASN1STOP
```

Sensor-LocationInfo field descriptions

sensor-MeasurementInformation

This field provides barometric pressure measurements as Sensor-MeasurementInformation defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

sensor-MotionInformation

This field provides motion sensor measurements as Sensor-MotionInformation defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

ServingCellAndBWP-Id

The IE ServingCellAndBWP-Id is used to indicate a serving cell and an uplink or a downlink BWP.

ServingCellAndBWP-Id information element

- ServCellIndex

The IE *ServCellIndex* concerns a short identity, used to uniquely identify a serving cell (i.e. the PCell, the PSCell or an SCell) across the cell groups. Value 0 applies for the PCell, while the *SCellIndex* that has previously been assigned applies for SCells.

ServCellIndex information element

```
-- ASN1START
-- TAG-SERVCELLINDEX-START

ServCellIndex ::= INTEGER (0..maxNrofServingCells-1)
-- TAG-SERVCELLINDEX-STOP
-- ASN1STOP
```

ServingCellConfig

The IE *ServingCellConfig* is used to configure (add or modify) the UE with a serving cell, which may be the SpCell or an SCell of an MCG or SCG. The parameters herein are mostly UE specific but partly also cell specific (e.g. in additionally configured bandwidth parts). Reconfiguration between a PUCCH and PUCCHless SCell is only supported using an SCell release and add.

ServingCellConfig information element

```
-- ASN1START
-- TAG-SERVINGCELLCONFIG-START
ServingCellConfig ::=
                                    SEOUENCE {
    tdd-UL-DL-ConfigurationDedicated
                                       TDD-UL-DL-ConfigDedicated
                                                                                                                 OPTIONAL,
                                                                                                                            -- Cond TDD
    initialDownlinkBWP
                                       BWP-DownlinkDedicated
                                                                                                                 OPTIONAL. -- Need M
    downlinkBWP-ToReleaseList.
                                       SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Id
                                                                                                                 OPTIONAL, -- Need N
                                                                                                                            -- Need N
    downlinkBWP-ToAddModList
                                       SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Downlink
                                                                                                                 OPTIONAL.
                                                                                                                 OPTIONAL, -- Cond SyncAndCellAdd
    firstActiveDownlinkBWP-Id
                                       BWP-Id
    bwp-InactivityTimer
                                        ENUMERATED {ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30,
                                                    ms40,ms50, ms60, ms80,ms100, ms200,ms300, ms500,
                                                   ms750, ms1280, ms1920, ms2560, spare10, spare9, spare8,
                                                    spare7, spare6, spare5, spare4, spare3, spare2, spare1 }
                                                                                                               OPTIONAL,
                                                                                                                           --Need R
    defaultDownlinkBWP-Id
                                       BWP-Id
                                                                                                               OPTIONAL,
                                                                                                                           -- Need S
                                       UplinkConfig
                                                                                                               OPTIONAL,
                                                                                                                           -- Need M
    uplinkConfig
                                                                                                               OPTIONAL,
                                                                                                                           -- Need M
    supplementaryUplink
                                       UplinkConfig
                                                                                                                           -- Need M
    pdcch-ServingCellConfig
                                        SetupRelease { PDCCH-ServingCellConfig }
                                                                                                               OPTIONAL.
    pdsch-ServingCellConfig
                                        SetupRelease {
                                                      PDSCH-ServingCellConfig }
                                                                                                               OPTIONAL,
                                                                                                                           -- Need M
    csi-MeasConfig
                                        SetupRelease { CSI-MeasConfig }
                                                                                                               OPTIONAL.
                                                                                                                           -- Need M
    sCellDeactivationTimer
                                        ENUMERATED {ms20, ms40, ms80, ms160, ms200, ms240,
                                                   ms320, ms400, ms480, ms520, ms640, ms720,
                                                    ms840, ms1280, spare2, spare1}
                                                                                       OPTIONAL, -- Cond ServingCellWithoutPUCCH
                                        CrossCarrierSchedulingConfig
    crossCarrierSchedulingConfig
                                                                                                               OPTIONAL, -- Need M
    tag-Id
                                        TAG-Id,
                                        ENUMERATED {enabled}
    dummy1
                                                                                                               OPTIONAL,
                                                                                                                           -- Need R
    pathlossReferenceLinking
                                       ENUMERATED {spCell, sCell}
                                                                                                               OPTIONAL,
                                                                                                                           -- Cond SCellOnly
    servingCellMO
                                       MeasObjectId
                                                                                                               OPTIONAL,
                                                                                                                           -- Cond MeasObject
    . . . ,
    [ [
    lte-CRS-ToMatchAround
                                        SetupRelease { RateMatchPatternLTE-CRS }
                                                                                                                           -- Need M
                                                                                                               OPTIONAL,
                                        SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPattern
                                                                                                               OPTIONAL,
                                                                                                                           -- Need N
    rateMatchPatternToAddModList
                                                                                                                           -- Need N
                                        SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPatternId
                                                                                                               OPTIONAL,
    rateMatchPatternToReleaseList
    downlinkChannelBW-PerSCS-List
                                        SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier
                                                                                                               OPTIONAL
                                                                                                                           -- Need S
    ]],
    supplementaryUplinkRelease-r16
                                       ENUMERATED {true}
                                                                                                               OPTIONAL,
                                                                                                                           -- Need N
    tdd-UL-DL-ConfigurationDedicated-IAB-MT-r16
                                                  TDD-UL-DL-ConfigDedicated-IAB-MT-r16
                                                                                                               OPTIONAL,
                                                                                                                           -- Cond TDD_IAB
    dormantBWP-Config-r16
                                       SetupRelease { DormantBWP-Config-r16 }
                                                                                                               OPTIONAL,
                                                                                                                           -- Need M
    ca-SlotOffset-r16
                                       CHOICE {
       refSCS15kHz
                                           INTEGER (-2..2),
       refSCS30KHz
                                           INTEGER (-5..5),
                                           INTEGER (-10..10),
       refSCS60KHz
       refSCS120KHz
                                           INTEGER (-20..20)
                                                                                                               OPTIONAL,
                                                                                                                          -- Cond AsyncCA
```

```
SetupRelease { DummyJ }
                                                                                                             OPTIONAL,
                                                                                                                        -- Need M
    intraCellGuardBandsDL-List-r16
                                       SEQUENCE (SIZE (1..maxSCSs)) OF IntraCellGuardBandsPerSCS-r16
                                                                                                             OPTIONAL. -- Need S
    intraCellGuardBandsUL-List-r16
                                       SEQUENCE (SIZE (1..maxSCSs)) OF IntraCellGuardBandsPerSCS-r16
                                                                                                             OPTIONAL. -- Need S
                                                                                                             OPTIONAL,
    csi-RS-ValidationWithDCI-r16
                                       ENUMERATED {enabled}
                                                                                                                        -- Need R
                                       SetupRelease { LTE-CRS-PatternList-r16 }
    lte-CRS-PatternList1-r16
                                                                                                             OPTIONAL.
                                                                                                                        -- Need M
                                       SetupRelease { LTE-CRS-PatternList-r16 }
                                                                                                                        -- Need M
   lte-CRS-PatternList2-r16
                                                                                                             OPTIONAL,
    crs-RateMatch-PerCORESETPoolIndex-r16 ENUMERATED {enabled}
                                                                                                             OPTIONAL,
                                                                                                                        -- Need R
    enableTwoDefaultTCI-States-r16
                                       ENUMERATED {enabled}
                                                                                                             OPTIONAL, -- Need R
    enableDefaultTCI-StatePerCoresetPoolIndex-r16 ENUMERATED {enabled}
                                                                                                             OPTIONAL, -- Need R
                                       ENUMERATED {true}
                                                                                                             OPTIONAL,
                                                                                                                        -- Need R
    enableBeamSwitchTiming-r16
                                       ENUMERATED {enabled}
                                                                                                             OPTIONAL,
                                                                                                                        -- Need R
    cbg-TxDiffTBsProcessingType1-r16
    cbg-TxDiffTBsProcessingType2-r16
                                       ENUMERATED {enabled}
                                                                                                             OPTIONAL
                                                                                                                         -- Need R
    11,
    ГΓ
    directionalCollisionHandling-r16
                                       ENUMERATED {enabled}
                                                                                                             OPTIONAL.
                                                                                                                         -- Need R
    channelAccessConfig-r16
                                       SetupRelease { ChannelAccessConfig-r16 }
                                                                                                             OPTIONAL
                                                                                                                         -- Need M
    ]],
    ] ]
                                          SetupRelease {NR-DL-PRS-PDC-Info-r17}
    nr-dl-PRS-PDC-Info-r17
                                                                                                             OPTIONAL,
                                                                                                                        -- Need M
                                                                                                                        -- Need M
                                          SetupRelease {SemiStaticChannelAccessConfigUE-r17}
    semiStaticChannelAccessConfigUE-r17
                                                                                                             OPTIONAL,
   mimoParam-r17
                                       SetupRelease {MIMOParam-r17}
                                                                                                             OPTIONAL,
                                                                                                                        -- Need M
                                       ENUMERATED {enabled}
                                                                                                             OPTIONAL, -- Need R
    channelAccessMode2-r17
                                       ENUMERATED {enabled}
    timeDomainHARQ-BundlingType1-r17
                                                                                                             OPTIONAL, -- Need R
                                                                                                                        -- Need R
    nrofHARO-BundlingGroups-r17
                                       ENUMERATED {n1, n2, n4}
                                                                                                             OPTIONAL,
    fdmed-ReceptionMulticast-r17
                                       ENUMERATED {true}
                                                                                                             OPTIONAL,
                                                                                                                        -- Need R
   moreThanOneNackOnlyMode-r17
                                       ENUMERATED {mode2}
                                                                                                             OPTIONAL,
                                                                                                                        -- Need S
    tci-ActivatedConfig-r17
                                       TCI-ActivatedConfig-r17
                                                                                                             OPTIONAL,
                                                                                                                         -- Cond
TCI ActivatedConfig
    directionalCollisionHandling-DC-r17 ENUMERATED {enabled}
                                                                                                             OPTIONAL,
                                                                                                                         -- Need R
   lte-NeighCellsCRS-AssistInfoList-r17 SetupRelease { LTE-NeighCellsCRS-AssistInfoList-r17 }
                                                                                                             OPTIONAL
                                                                                                                         -- Need M
    11,
    ] ]
    OPTIONAL
                                                                                                                         -- Need R
    ]]
UplinkConfig ::=
                                   SEOUENCE {
   initialUplinkBWP
                                       BWP-UplinkDedicated
                                                                                                             OPTIONAL, -- Need M
                                       SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Id
                                                                                                                        -- Need N
    uplinkBWP-ToReleaseList
                                                                                                             OPTIONAL,
    uplinkBWP-ToAddModList
                                       SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Uplink
                                                                                                             OPTIONAL,
                                                                                                                        -- Need N
                                                                                                                        -- Cond SyncAndCellAdd
    firstActiveUplinkBWP-Id
                                       BWP-Id
                                                                                                             OPTIONAL,
                                                                                                                        -- Need M
    pusch-ServingCellConfig
                                       SetupRelease { PUSCH-ServingCellConfig }
                                                                                                             OPTIONAL.
                                       SetupRelease { SRS-CarrierSwitching }
                                                                                                             OPTIONAL,
                                                                                                                        -- Need M
    carrierSwitching
    . . . ,
   powerBoostPi2BPSK
                                       BOOT.FAN
                                                                                                             OPTIONAL,
                                                                                                                        -- Need M
    uplinkChannelBW-PerSCS-List
                                       SEOUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier
                                                                                                             OPTIONAL
                                                                                                                         -- Need S
    ]],
    11
    enablePL-RS-UpdateForPUSCH-SRS-r16 ENUMERATED {enabled}
                                                                                                             OPTIONAL,
                                                                                                                        -- Need R
                                                                                                             OPTIONAL, -- Need R
    enableDefaultBeamPL-ForPUSCH0-0-r16 ENUMERATED {enabled}
    enableDefaultBeamPL-ForPUCCH-r16
                                      ENUMERATED {enabled}
                                                                                                             OPTIONAL, -- Need R
    enableDefaultBeamPL-ForSRS-r16
                                       ENUMERATED {enabled}
                                                                                                             OPTIONAL,
                                                                                                                        -- Need R
                                       SetupRelease { UplinkTxSwitching-r16 }
                                                                                                             OPTIONAL, -- Need M
    uplinkTxSwitching-r16
```

```
ENUMERATED {true}
    mpr-PowerBoost-FR2-r16
                                                                                                                  OPTIONAL
                                                                                                                              -- Need R
    11
DummyJ ::=
                                     SEQUENCE {
                                            INTEGER (-85..-52),
    maxEnergyDetectionThreshold-r16
    energyDetectionThresholdOffset-r16
                                            INTEGER (-20..-13),
    ul-toDL-COT-SharingED-Threshold-r16
                                            INTEGER (-85..-52)
                                                                                                                  OPTIONAL,
                                                                                                                              -- Need R
    absenceOfAnyOtherTechnology-r16
                                            ENUMERATED {true}
                                                                                                                  OPTIONAL
                                                                                                                              -- Need R
ChannelAccessConfig-r16 ::=
                                     SEOUENCE {
    energyDetectionConfig-r16
                                        CHOICE {
        maxEnergyDetectionThreshold-r16
                                                INTEGER (-85..-52),
        energyDetectionThresholdOffset-r16
                                                INTEGER (-13..20)
                                                                                                                  OPTIONAL,
                                                                                                                              -- Need R
    ul-toDL-COT-SharingED-Threshold-r16
                                                INTEGER (-85..-52)
                                                                                                                  OPTIONAL,
                                                                                                                              -- Need R
    absenceOfAnyOtherTechnology-r16
                                                ENUMERATED {true}
                                                                                                                  OPTIONAL
                                                                                                                              -- Need R
IntraCellGuardBandsPerSCS-r16 ::=
                                       SEOUENCE {
    guardBandSCS-r16
                                            SubcarrierSpacing,
    intraCellGuardBands-r16
                                            SEQUENCE (SIZE (1..4)) OF GuardBand-r16
GuardBand-r16 ::=
                                       SEOUENCE {
    startCRB-r16
                                           INTEGER (0..274),
    nrofCRBs-r16
                                           INTEGER (0..15)
DormancyGroupID-r16 ::=
                                INTEGER (0..4)
DormantBWP-Config-r16::=
                                       SEOUENCE {
    dormantBWP-Id-r16
                                           BWP-Id
                                                                                                              OPTIONAL,
                                                                                                                          -- Need M
    withinActiveTimeConfig-r16
                                            SetupRelease { WithinActiveTimeConfig-r16 }
                                                                                                              OPTIONAL,
                                                                                                                          -- Need M
                                            SetupRelease { OutsideActiveTimeConfig-r16 }
    outsideActiveTimeConfig-r16
                                                                                                              OPTIONAL
                                                                                                                          -- Need M
WithinActiveTimeConfig-r16 ::=
                                       SEOUENCE
   firstWithinActiveTimeBWP-Id-r16
                                            BWP-Id
                                                                                                              OPTIONAL,
                                                                                                                          -- Need M
                                                                                                                          -- Need R
   dormancyGroupWithinActiveTime-r16
                                            DormancyGroupID-r16
                                                                                                              OPTIONAL
OutsideActiveTimeConfig-r16 ::=
                                       SEOUENCE {
   firstOutsideActiveTimeBWP-Id-r16
                                            BWP-Id
                                                                                                              OPTIONAL,
                                                                                                                          -- Need M
   dormancyGroupOutsideActiveTime-r16
                                           DormancyGroupID-r16
                                                                                                              OPTIONAL
                                                                                                                          -- Need R
UplinkTxSwitching-r16 ::=
                                       SEQUENCE {
    uplinkTxSwitchingPeriodLocation-r16
                                            BOOLEAN,
    uplinkTxSwitchingCarrier-r16
                                            ENUMERATED {carrier1, carrier2}
MIMOParam-r17 ::= SEQUENCE {
```

```
additionalPCI-ToAddModList-r17
                                     SEQUENCE (SIZE(1..maxNrofAdditionalPCI-r17)) OF SSB-MTC-AdditionalPCI-r17 OPTIONAL, -- Need N
    additionalPCI-ToReleaseList-r17
                                     SEQUENCE (SIZE(1..maxNrofAdditionalPCI-r17)) OF AdditionalPCIIndex-r17
                                                                                                              OPTIONAL. -- Need N
    unifiedTCI-StateType-r17
                                     ENUMERATED {separate, joint}
                                                                                                        OPTIONAL. -- Need R
    uplink-PowerControlToAddModList-r17 SEOUENCE (SIZE (1..maxUL-TCI-r17)) OF Uplink-powerControl-r17
                                                                                                        OPTIONAL, -- Need N
    uplink-PowerControlToReleaseList-r17 SEQUENCE (SIZE (1..maxUL-TCI-r17)) OF Uplink-powerControlId-r17
                                                                                                        OPTIONAL. -- Need N
                                     ENUMERATED {sfnSchemeA,sfnSchemeB}
                                                                                                        OPTIONAL, -- Need R
    sfnSchemePDCCH-r17
    sfnSchemePDSCH-r17
                                     ENUMERATED {sfnSchemeA,sfnSchemeB}
                                                                                                        OPTIONAL
                                                                                                                   -- Need R
-- TAG-SERVINGCELLCONFIG-STOP
-- ASN1STOP
```

ChannelAccessConfig field descriptions

absenceOfAnyOtherTechnology

Presence of this field indicates absence on a long term basis (e.g. by level of regulation) of any other technology sharing the carrier; absence of this field indicates the potential presence of any other technology sharing the carrier, as specified in TS 37.213 [48] clauses 4.2.1 and 4.2.3.

energyDetectionConfig

Indicates whether to use the maxEnergyDetectionThreshold or the energyDetectionThresholdOffset (see TS 37.213 [48], clause 4.2.3).

energyDetectionThresholdOffset

Indicates the offset to the default maximum energy detection threshold value. Unit in dB. Value -13 corresponds to -13dB, value -12 corresponds to -12dB, and so on (i.e. in steps of 1dB) as specified in TS 37.213 [48], clause 4.2.3.

maxEnergyDetectionThreshold

Indicates the absolute maximum energy detection threshold value. Unit in dBm. Value -85 corresponds to -85 dBm, value -84 corresponds to -84 dBm, and so on (i.e. in steps of 1dBm) as specified in TS 37.213 [48], clause 4.2.3.

ul-toDL-COT-SharingED-Threshold

Maximum energy detection threshold that the UE should use to share channel occupancy with gNB for DL transmission as specified in TS 37.213 [48], clause 4.1.3 for downlink channel access and clause 4.2.3 for uplink channel access. This field is not applicable in semi-static channel access mode.

ServingCellConfig field descriptions

additionalPCI-ToAddModList

List of information for the additional SSB with different PCI than the serving cell PCI. The additional SSBs with different PCIs are not used for serving cell quality derivation.

bwp-InactivityTimer

The duration in ms after which the UE falls back to the default Bandwidth Part (see TS 38.321 [3], clause 5.15). When the network releases the timer configuration, the UE stops the timer without switching to the default BWP.

ca-SlotOffset

Slot offset between the primary cell (PCell/PSCell) and the SCell in unaligned frame boundary with slot alignment and partial SFN alignment inter-band CA. Based on this field, the UE determines the time offset of the SCell as specified in clause 4.5 of TS 38.211 [16]. The granularity of this field is determined by the reference SCS for the slot offset (i.e. the maximum of PCell/PSCell lowest SCS among all the configured SCSs in DL/UL SCS-SpecificCarrierList in ServingCellConfigCommon or

ServingCellConfigCommonSIB and this serving cell's lowest SCS among all the configured SCSs in DL/UL SCS-SpecificCarrierList in ServingCellConfigCommon or ServingCellConfigCommonSIB).

The Network configures at most single non-zero offset duration in ms (independent on SCS) among CCs in the unaligned CA configuration. If the field is absent, the UE applies the value of 0. The slot offset value can only be changed with SCell release and add.

cbg-TxDiffTBsProcessingType1, cbg-TxDiffTBsProcessingType2

Indicates whether processing types 1 and 2 based CBG based operation is enabled according to Rel-16 UE capabilities.

channelAccessConfig

List of parameters used for access procedures of operation with shared spectrum channel access (see TS 37.213 [48).

channelAccessMode2

If present, this field indicates that the UE shall apply channel access procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2. If absent, the UE does not apply these channel access procedures. The network always configures this field if channel access procedures are required for the serving cell within this region by regulations.

Overwrites the corresponding field in ServingCellConfigCommon or ServingCellConfigCommonSIB for this serving cell.

crossCarrierSchedulingConfig

Indicates whether this serving cell is cross-carrier scheduled by another serving cell or whether it cross-carrier schedules another serving cell. If the field *other* is configured for an SpCell (i.e., the SpCell is cross-carrier scheduled by another serving cell), the SpCell can be additionally scheduled by the PDCCH on the SpCell.

crs-RateMatch-PerCORESETPoolIndex

Indicates how UE performs rate matching when both Ite-CRS-PatternList1-r16 and Ite-CRS-PatternList2-r16 are configured as specified in TS 38.214 [19], clause 5.1.4.2.

csi-RS-ValidationWithDCl

Indicates how the UE performs periodic and semi-persistent CSI-RS reception in a slot. The presence of this field indicates that the UE uses DCI detection to validate whether to receive CSI-RS (see TS 38.213 [13], clause 11.1).

defaultDownlinkBWP-Id

The initial bandwidth part is referred to by BWP-Id = 0. ID of the downlink bandwidth part to be used upon expiry of the BWP inactivity timer. This field is UE specific. When the field is absent the UE uses the initial BWP as default BWP. (see TS 38.213 [13], clause 12 and TS 38.321 [3], clause 5.15).

directionalCollisionHandling

Indicates that this serving cell is using directional collision handling between a reference and other cell(s) for half-duplex operation in TDD CA with same SCS as specified in TS 38.213 [13], clause 11.1. The half-duplex operation only applies within the same frequency range and cell group.

The network only configures this field for TDD serving cells that are using the same SCS.

directionalCollisionHandling-DC

For the IAB-MT, it indicates that this serving cell is using directional collision handling between a reference and other cell(s) for half-duplex operation in TDD NR-DC with same SCS within same cell group or cross different cell groups.

dormantBWP-Config

The dormant BWP configuration for an SCell. This field can be configured only for a (non-PUCCH) SCell.

downlinkBWP-ToAddModList

List of additional downlink bandwidth parts to be added or modified. (see TS 38.213 [13], clause 12).

downlinkBWP-ToReleaseList

List of additional downlink bandwidth parts to be released. (see TS 38.213 [13], clause 12).

downlinkChannelBW-PerSCS-List

A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in scs-SpecificCarrierList in DownlinkConfigCommon / DownlinkConfigCommonSIB. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15] and TS 38.101-2 [39].

dummy1, dummy 2

This field is not used in the specification. If received it shall be ignored by the UE.

enableBeamSwitchTiming

Indicates the aperiodic CSI-RS triggering with beam switching triggering behaviour as defined in clause 5.2.1.5.1 of TS 38.214 [19].

enableDefaultTCI-StatePerCoresetPoolIndex

Presence of this field indicates the UE shall follow the release 16 behavior of default TCI state per CORESETPoolindex when the UE is configured by higher layer parameter PDCCH-Config that contains two different values of CORESETPoolIndex in ControlResourceSet is enabled.

enableTwoDefaultTCI-States

Presence of this field indicates the UE shall follow the release 16 behavior of two default TCI states for PDSCH when at least one TCI codepoint is mapped to two TCI states is enabled

fdmed-ReceptionMulticast

Indicates the Type-1 HARQ codebook generation as specified in TS 38.213 [13], clause 9.1.2.1.

firstActiveDownlinkBWP-Id

If configured for an SpCell, this field contains the ID of the DL BWP to be activated or to be used for RLM, BFD and measurements if included in an RRCReconfiguration message contained in an NR or E-UTRA RRC message indicating that the SCG is deactivated, upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch. If the field is absent for the PSCell at SCG deactivation, the UE considers the previously activated DL BWP as the BWP to be used for RLM, BFD and measurements. If the field is absent for the PSCell at SCG activation, the DL BWP to be activated is the DL BWP previously to be used for RLM, BFD and measurements.

If configured for an SCell, this field contains the ID of the downlink bandwidth part to be used upon activation of an SCell. The initial bandwidth part is referred to by BWP-Id = 0.

Upon reconfiguration with reconfigurationWithSync, the network sets the firstActiveDownlinkBWP-Id and firstActiveUplinkBWP-Id to the same value.

initialDownlinkBWP

The dedicated (UE-specific) configuration for the initial downlink bandwidth-part (i.e., DL BWP#0). If any of the optional IEs are configured within this IE, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1

intraCellGuardBandsDL-List, intraCellGuardBandsUL-List

List of intra-cell guard bands in a serving cell for operation with shared spectrum channel access in FR1. If not configured, the guard bands are defined according to 38.101-1 [15], see TS 38.214 [19], clause 7. For operation in licensed spectrum, this field is absent, and no UE action is required.

Ite-CRS-PatternList1

A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH. The LTE CRS patterns in this list shall be non-overlapping in frequency. The network does not configure this field and *Ite-CRS-ToMatchAround* simultaneously.

Ite-CRS-PatternList2

A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH scheduled with a DCI detected on a CORESET with CORESETPoolIndex configured with 1. This list is configured only if CORESETPoolIndex configured with 1. The first LTE CRS pattern in this list shall be fully overlapping in frequency with the first LTE CRS pattern in Ite-CRS-PatternList1, The second LTE CRS pattern in this list shall be fully overlapping in frequency with the second LTE CRS pattern in Ite-CRS-PatternList1, and so on. Network configures this field only if the field Ite-CRS-ToMatchAround is not configured and there is at least one ControlResourceSet in one DL BWP of this serving cell with coresetPoolIndex set to 1.

Ite-CRS-ToMatchAround

Parameters to determine an LTE CRS pattern that the UE shall rate match around.

Ite-NeighCellsCRS-AssistInfoList

A list of LTE neighbour cells configuration information which is used to assist the UE to perform CRS interference mitigation (CRS-IM) in scenarios with overlapping spectrum for LTE and NR (see TS 38.101-4 [59]). If the field is included, it replaces any previous list, i.e. all the entries of the list are replaced and each of the LTE-NeighCellsCRS-AssistInfo entries is considered to be newly created and the conditions and Need codes for setup of the entry apply.

Ite-NeighCellsCRS-Assumptions

If the field is not configured, the following default network configuration assumptions are valid for all LTE neighbour cells for the purpose of CRS interference mitigation (CRS-IM) in scenarios with overlapping spectrum for LTE and NR (see TS 38.101-4 [59]).

- The CRS port number is the same as the one indicated in RateMatchPatternLTE-CRS if configured for the serving cell.
- The CRS port number is 4 if RateMatchPatternLTE-CRS is not configured for the serving cell.
- The channel bandwidth and centre frequency are the same as the ones indicated in RateMatchPatternLTE-CRS if configured for the serving cell.
- The MBSFN configuration is the same as the one indicated in *RateMatchPatternLTE-CRS* if configured for the serving cell. If *RateMatchPatternLTE-CRS* is not configured for the serving cell, MBSFN subframe is not configured.
- Network-based CRS interference mitigation (i.e., CRS muting), as in crs-IntfMitigConfig specified in TS 36.331 [10], is not enabled.

If the field is configured (i.e. false) and LTE-NeighCellsCRS-AssistInfoList is configured, the configuration provided in LTE-NeighCellsCRS-AssistInfoList overrides the default network configuration assumptions.

If the field is configured (i.e. false) and LTE-NeighCellsCRS-AssistInfoList is not configured, it is up to the UE implementation whether to apply CRS-IM operation.

nr-dl-PRS-PDC-Info

Configures the DL PRS for propagation delay compensation. When configured, the UE measures the UE Rx-Tx time difference based on the reference signals configured in this field.

nrofHARQ-BundlingGroups

Indicates the number of HARQ bundling groups for type2 HARQ-ACK codebook.

pathlossReferenceLinking

Indicates whether UE shall apply as pathloss reference either the downlink of SpCell (PCell for MCG or PSCell for SCG) or of SCell that corresponds with this uplink (see TS 38.213 [13], clause 7).

pdsch-ServingCellConfig

PDSCH related parameters that are not BWP-specific.

rateMatchPatternToAddModList

Resources patterns which the UE should rate match PDSCH around. The UE rate matches around the union of all resources indicated in the rate match patterns. Rate match patterns defined here on cell level apply only to PDSCH of the same numerology. See TS 38.214 [19], clause 5.1.4.1. If a *RateMatchPattern* with the same *RateMatchPatternld* is configured in both *ServingCellConfig/ServingCellConfigCommon* and in SIB20/MCCH, the entire *RateMatchPattern* configuration shall be the same, including the set of RBs/REs indicated by the patterns for the rate matching around, and they are counted as a single rate match pattern in the total configured rate match patterns as defined in TS 38.214 [19].

sCellDeactivationTimer

SCell deactivation timer in TS 38.321 [3]. If the field is absent, the UE applies the value infinity.

sfnSchemePDCCH

This parameter is used to configure SFN scheme for PDCCH: sfnSchemeA or sfnSchemeB as specified (see TS 38.214 [19], clause 5.1). If network includes both sfnSchemePDCCH and sfnSchemePDSCH. same value shall be configured.

sfnSchemePDSCH

This parameter is used to configure SFN scheme for PDSCH: sfnSchemeA or sfnSchemeB as specified (see TS 38.214 [19], clause 5.1). If network includes both sfnSchemePDSCH and sfnSchemePDSCH, same value shall be configured.

semiStaticChannelAccessConfigUE

When this field is configured and when *channelAccessMode-r16* (see IE ServingCellConfigCommon and IE ServingCellConfigCommonSIB) is configured to *semiStatic*, the UE operates in semi-static channel access mode and can initiate a channel occupancy periodically (see TS 37.213 [48], Clause 4.3).

The period can be configured independently from period configured in SemiStaticChannelAccessConfig-r16 if the UE indicates the corresponding capability. Otherwise, the periodicity configured by periodUE-r17 is an integer multiple of or an integer factor of the periodicity indicated by period in SemiStaticChannelAccessConfig-r16.

servingCelIMO

meas ObjectId of the Meas ObjectNR in Meas Config which is associated to the serving cell. For this Meas ObjectNR, the following relationship applies between this Meas ObjectNR and frequency InfoDL in Serving Cell Config Common of the serving cell: if ssbFrequency is configured, its value is the same as the absolute Frequency SSB and if csi-rs-Resource Config Mobility is configured, the value of its subcarrier Spacing is present in one entry of the scs-Specific Carrier List, csi-RS-Cell List Mobility includes an entry corresponding to the serving cell (with cellId equal to phys CellId in Serving CellConfig Common) and the frequency range indicated by the csi-rs-Measurement BW of the entry in csi-RS-Cell List Mobility is included in the frequency range indicated by in the entry of the scs-Specific Carrier List.

supplementaryUplink

Network may configure this field only when *supplementaryUplinkConfig* is configured in *ServingCellConfigCommon* or *supplementaryUplink* is configured in *ServingCellConfigCommonSIB*.

supplementaryUplinkRelease

If this field is included, the UE shall release the uplink configuration configured by supplementaryUplink. The network only includes either supplementaryUplinkRelease or supplementaryUplink at a time.

tag-ld

Timing Advance Group ID, as specified in TS 38.321 [3], which this cell belongs to.

tci-ActivatedConfig

If configured for an SCell, or if configured for the PSCell when the SCG is being activated upon the reception of the containing message, the UE shall consider the TCI states provided in this field as the activated TCI states for PDCCH/PDSCH reception on this serving cell.

If configured for the PSCell when the SCG is indicated as deactivated in the containing message:

- the UE shall consider the TCI states provided in this field as the TCI states to be activated for PDCCH/PDSCH reception upon a later SCG activation in which tci-ActivatedConfig is absent
- if bfd-and-RLM is configured and no RS is configured in *RadioLinkMonitoringConfig* for RLM, respectively for BFD, the UE shall use the TCI states provided in this field for PDCCH as RS for RLM, respectively for BFD.

When this field is absent for the PSCell and the SCG is being deactivated:

- the UE shall consider the previously activated TCI states as the TCI states to be activated for PDCCH/PDSCH reception upon a later SCG activation in which tci-ActivatedConfig is absent
- if bfd-and-RLM is configured and no RS is configured in RadioLinkMonitoringConfig for RLM, respectively for BFD, the UE shall use the previously activated TCI states for PDCCH as RS for RLM, respectively for BFD.

tdd-UL-DL-ConfigurationDedicated-IAB-MT

Resource configuration per IAB-MT D/U/F overrides all symbols (with a limitation that effectively only flexible symbols can be overwritten in Rel-16) per slot over the number of slots as provided by TDD-UL-DL ConfigurationCommon.

unifiedTCI-StateType

Indicates the unified TCI state type the UE is configured for this serving cell. The value *separate* means this serving cell is configured with *dl-OrJointTCI-StateList* for DL TCI state and *ul-TCI-ToAddModList* for UL TCI state. The value *joint* means this serving cell is configured with *dl-OrJointTCI-StateList* for joint TCI state for UL and DL operation. The network does not configure the field in a serving cell that is configured with more than one value for the *coresetPoolIndex*.

uplinkConfig

Network may configure this field only when *uplinkConfigCommon* is configured in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*. Addition or release of this field can only be done upon SCell addition or release (respectively).

uplink-PowerControlToAddModList

Configures UL power control parameters for PUSCH, PUCCH and SRS when field unifiedTCI-StateType is configured for this serving cell.

UplinkConfig field descriptions

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carrierSwitching

Includes parameters for configuration of carrier based SRS switching (see TS 38.214 [19], clause 6.2.1.3.

enableDefaultBeamPL-ForPUSCH0-0, enableDefaultBeamPL-ForPUCCH, enableDefaultBeamPL-ForSRS

When the parameter is present, UE derives the spatial relation and the corresponding pathloss reference Rs as specified in 38.213, clauses 7.1.1, 7.2.1, 7.3.1 and 9.2.2. The network only configures these parameters for FR2.

enablePL-RS-UpdateForPUSCH-SRS

When this parameter is present, the Rel-16 feature of MAC CE based pathloss RS updates for PUSCH/SRS is enabled. Network only configures this parameter when the UE is configured with *sri-PUSCH-PowerControl*. If this field is not configured, network configures at most 4 pathloss RS resources for PUSCH/PUCCH/SRS transmissions per BWP, not including pathloss RS resources for SRS transmissions for positioning. (See TS 38.213 [13], clause 7).

firstActiveUplinkBWP-Id

If configured for an SpCell, this field contains the ID of the UL BWP to be activated upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch.

If configured for an SCell, this field contains the ID of the uplink bandwidth part to be used upon activation of an SCell. The initial bandwidth part is referred to by BandiwdthPartId = 0.

initialUplinkBWP

The dedicated (UE-specific) configuration for the initial uplink bandwidth-part (i.e. UL BWP#0). If any of the optional IEs are configured within this IE as part of the IE *uplinkConfig*, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1

moreThanOneNackOnlyMode

Indicates the mode of supporting more than one NACK-only feedback in the same PUCCH transmission. Mode 1 means UE multiplexing the HARQ-ACK bits by transforming NACK-only into ACK/NACK HARQ bits. Mode 2 means UE transmitting a specific sequence or a PUCCH transmission corresponding to the combination of more than one NACK-only HARQ feedback. If multicast CFR is not configured, this field is not included. Otherwise, if the field is absent, UE uses mode 1 for multicast CFR.

mpr-PowerBoost-FR2

Indicates whether UE is allowed to boost uplink transmission power by suspending in-band emission (IBE) requirements as specified in TS 38.101-2 [39]. Network only configures this field for FR2 serving cells.

powerBoostPi2BPSK

If this field is set to *true*, the UE determines the maximum output power for PUCCH/PUSCH transmissions that use pi/2 BPSK modulation according to TS 38.101-1 [15], clause 6.2.4.

pusch-ServingCellConfig

PUSCH related parameters that are not BWP-specific.

uplinkBWP-ToAddModList

The additional bandwidth parts for uplink to be added or modified. In case of TDD uplink- and downlink BWP with the same bandwidthPartId are considered as a BWP pair and must have the same center frequency.

uplinkBWP-ToReleaseList

The additional bandwidth parts for uplink to be released.

uplinkChannelBW-PerSCS-List

A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in scs-SpecificCarrierList in UplinkConfigCommon / UplinkConfigCommonSIB. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15] and TS 38.101-2 [39].

uplinkTxSwitchingPeriodLocation

Indicates whether the location of UL Tx switching period is configured in this uplink carrier in case of inter-band UL CA, SUL, or (NG)EN-DC, as specified in TS 38.101-1 [15] and TS 38.101-3 [34].

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In case of (NG)EN-DC, network always configures this field to TRUE for NR carrier (i.e. with (NG)EN-DC, the UL switching period always occurs on the NR carrier). In case of inter-band UL CA or SUL, for dynamic uplink Tx switching between 2 bands with 2 uplink carriers or 3 uplink carriers as defined in TS 38.101-1 [15], network configures this field to TRUE for the uplink carrier(s) on one band and configures this field to FALSE for the uplink carrier(s) on the other band. This field is set to the same value for the carriers on the same band.

uplinkTxSwitchingCarrier

Indicates that the configured carrier is carrier1 or carrier2 for dynamic uplink Tx switching, as defined in TS 38.101-1 [15] and TS 38.101-3 [34]. In case of (NG)EN-DC, network always configures the NR carrier as carrier 2.

In case of inter-band UL CA or SUL, for dynamic uplink Tx switching between 2 bands with 2 uplink carriers or 3 uplink carriers as defined in TS 38.101-1 [15], network configures the uplink carrier(s) on one band as carrier1 and the uplink carrier(s) on the other band as carrier2. This field is set to the same value for the carriers on the same band.

DormantBWP-Config field descriptions

dormancyGroupWithinActiveTime

This field contains the ID of an SCell group for Dormancy within active time, to which this SCell belongs. The use of the Dormancy within active time SCell groups is specified in TS 38.213 [13].

dormancyGroupOutsideActiveTime

This field contains the ID of an SCell group for Dormancy outside active time, to which this SCell belongs. The use of the Dormancy outside active time SCell groups is specified in TS 38.213 [13].

dormantBWP-Id

This field contains the ID of the downlink bandwidth part to be used as dormant BWP. If this field is configured, its value is different from *defaultDownlinkBWP-Id*, and at least one of the *withinActiveTimeConfig* and *outsideActiveTimeConfig* should be configured.

firstOutsideActiveTimeBWP-Id

This field contains the ID of the downlink bandwidth part to be activated when receiving a DCI indication for SCell dormancy outside active time.

firstWithinActiveTimeBWP-Id

This field contains the ID of the downlink bandwidth part to be activated when receiving a DCI indication for SCell dormancy within active time.

outsideActiveTimeConfig

This field contains the configuration to be used for SCell dormancy outside active time, as specified in TS 38.213 [13]. The field can only be configured when the cell group the SCell belongs to is configured with *dcp-Config*.

withinActiveTimeConfia

This field contains the configuration to be used for SCell dormancy within active time, as specified in TS 38.213 [13].

GuardBand field descriptions

startCRB

Indicates the starting RB of the guard band.

nrofCRB

Indicates the length of the guard band in RBs. When set to 0, zero-size guard band is used.

NOTE 1: If the dedicated part of initial UL/DL BWP configuration is absent, the initial BWP can be used but with some limitations. For example, changing to another BWP requires *RRCReconfiguration* since DCI format 1_0 doesn't support DCI-based switching.

Conditional Presence	Explanation
AsyncCA	This field is mandatory present for SCells whose slot offset between the SpCell is not 0. Otherwise it is absent, Need S.
MeasObject	This field is mandatory present for the SpCell if the UE has a measConfig, and it is optionally present, Need M, for SCells.
	For RedCap UEs, this field is optionally present, Need M.
SCellOnly	This field is optionally present, Need R, for SCells. It is absent otherwise.
ServingCellWithoutPUCCH	This field is optionally present, Need S, for SCells except PUCCH SCells. It is absent otherwise.
SyncAndCellAdd	This field is mandatory present for a SpCell upon reconfiguration with reconfigurationWithSync and upon
	RRCSetup/RRCResume.
	The field is optionally present for an SpCell, Need N, upon reconfiguration without reconfigurationWithSync.
	The field is mandatory present for an SCell upon addition, and absent for SCell in other cases, Need M.
TCI_ActivatedConfig	This field is optional Need N for SCells if sCellState is configured, otherwise it is absent.
	This field is optional Need S for the PSCell when the SCG is indicated as deactivated or is being activated, otherwise it is
	absent.
	This field is absent for the PCell.
TDD	This field is optionally present, Need R, for TDD cells. It is absent otherwise.
TDD_IAB	For IAB-MT, this field is optionally present, Need R, for TDD cells. It is absent otherwise.

ServingCellConfigCommon

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The IE ServingCellConfigCommon is used to configure cell specific parameters of a UE's serving cell. The IE contains parameters which a UE would typically acquire from SSB, MIB or SIBs when accessing the cell from IDLE. With this IE, the network provides this information in dedicated signalling when configuring a UE with a SCells or with an additional cell group (SCG). It also provides it for SpCells (MCG and SCG) upon reconfiguration with sync.

ServingCellConfigCommon information element

```
-- ASN1START
-- TAG-SERVINGCELLCONFIGCOMMON-START
ServingCellConfigCommon ::=
                                    SEOUENCE {
    physCellId
                                       PhysCellId
                                                                                                            OPTIONAL,
                                                                                                                      -- Cond HOAndServCellAdd,
    downlinkConfigCommon
                                       DownlinkConfigCommon
                                                                                                            OPTIONAL,
                                                                                                                      -- Cond HOAndServCellAdd
    uplinkConfigCommon
                                       UplinkConfigCommon
                                                                                                            OPTIONAL, -- Need M
    supplementaryUplinkConfig
                                       UplinkConfigCommon
                                                                                                            OPTIONAL, -- Need S
                                       ENUMERATED { n0, n25600, n39936 }
                                                                                                                      -- Need S
    n-TimingAdvanceOffset
                                                                                                            OPTIONAL,
    ssb-PositionsInBurst
                                       CHOICE {
        shortBitmap
                                            BIT STRING (SIZE (4)),
       mediumBitmap
                                           BIT STRING (SIZE (8)),
       longBitmap
                                           BIT STRING (SIZE (64))
                                                                                                            OPTIONAL, -- Cond AbsFreqSSB
    ssb-periodicityServingCell
                                        ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2, spare1 }
                                                                                                           OPTIONAL, -- Need S
    dmrs-TypeA-Position
                                        ENUMERATED {pos2, pos3},
    lte-CRS-ToMatchAround
                                       SetupRelease { RateMatchPatternLTE-CRS }
                                                                                                            OPTIONAL, -- Need M
                                       SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPattern
                                                                                                            OPTIONAL, -- Need N
    rateMatchPatternToAddModList
                                       SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPatternId OPTIONAL, -- Need N
    rateMatchPatternToReleaseList
                                                                                                            OPTIONAL, -- Cond HOAndServCellWithSSB
    ssbSubcarrierSpacing
                                       SubcarrierSpacing
    tdd-UL-DL-ConfigurationCommon
                                       TDD-UL-DL-ConfigCommon
                                                                                                            OPTIONAL, -- Cond TDD
    ss-PBCH-BlockPower
                                       INTEGER (-60..50),
```

-- ASN1STOP

```
channelAccessMode-r16
                                        CHOICE {
        dynamic
        semiStatic
                                            SemiStaticChannelAccessConfig-r16
                                                                                                            OPTIONAL, -- Cond SharedSpectrum
    discoveryBurstWindowLength-r16
                                            ENUMERATED {ms0dot5, ms1, ms2, ms3, ms4, ms5}
                                                                                                            OPTIONAL, -- Need R
    ssb-PositionOCL-r16
                                            SSB-PositionOCL-Relation-r16
                                                                                                            OPTIONAL, -- Cond SharedSpectrum
    highSpeedConfig-r16
                                            HighSpeedConfig-r16
                                                                                                            OPTIONAL -- Need R
    ]],
    highSpeedConfig-v1700
                                        HighSpeedConfig-v1700
                                                                                                            OPTIONAL, -- Need R
    channelAccessMode2-r17
                                        ENUMERATED {enabled}
                                                                                                            OPTIONAL, -- Cond SharedSpectrum2
                                                                                                            OPTIONAL, -- Need R
    discoveryBurstWindowLength-r17
                                        ENUMERATED {ms0dot125, ms0dot25, ms0dot5, ms0dot75, ms1, ms1dot25}
    ssb-PositionOCL-r17
                                        SSB-PositionQCL-Relation-r17
                                                                                                            OPTIONAL, -- Cond SharedSpectrum2
    highSpeedConfigFR2-r17
                                        HighSpeedConfigFR2-r17
                                                                                                            OPTIONAL, -- Need R
    uplinkConfigCommon-v1700
                                        UplinkConfigCommon-v1700
                                                                                                            OPTIONAL, -- Need R
                                                                                                            OPTIONAL -- Need R
    ntn-Config-r17
                                        NTN-Config-r17
    ]],
    [ [
    featurePriorities-r17
                                        SEQUENCE {
        redCapPriority-r17
                                            FeaturePriority-r17
                                                                                                            OPTIONAL, -- Need R
       slicingPriority-r17
                                            FeaturePriority-r17
                                                                                                            OPTIONAL, -- Need R
       msg3-Repetitions-Priority-r17
                                            FeaturePriority-r17
                                                                                                            OPTIONAL, -- Need R
                                                                                                            OPTIONAL -- Need R
        sdt-Priority-r17
                                            FeaturePriority-r17
                                                                                                            OPTIONAL -- Need R
    ]]
-- TAG-SERVINGCELLCONFIGCOMMON-STOP
```

ServingCellConfigCommon field descriptions

channelAccessMode

If present, this field indicates which channel access procedures to apply for operation with shared spectrum channel access as defined in TS 37.213 [48]. If the field is configured as "semiStatic", the UE shall apply the channel access procedures for semi-static channel occupancy as described in clause 4.3 in TS 37.213. If the field is configured as "dynamic", the UE shall apply the channel access procedures as defined in TS 37.213, clause 4.1 and 4.2.

channelAccessMode2

If present, the UE shall apply channel access procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2. If absent, the UE shall not apply any channel access procedure. The network always configures this field if channel access procedures are required for the serving cell within this region by regulations.

dmrs-TypeA-Position

Position of (first) DM-RS for downlink (see TS 38.211 [16], clause 7.4.1.1.1) and uplink (TS 38.211 [16], clause 6.4.1.1.3).

downlinkConfigCommon

The common downlink configuration of the serving cell, including the frequency information configuration and the initial downlink BWP common configuration. The parameters provided herein should match the parameters configured by MIB and SIB1 (if provided) of the serving cell, with the exception of *controlResourceSetZero* and *searchSpaceZero* which can be configured in *ServingCellConfigCommon* even if MIB indicates that they are absent.

discoveryBurstWindowLength

Indicates the window length of the discovery burst in ms (see TS 37.213 [48]). The field discoveryBurstWindowLength-r17 is applicable to SCS 480 kHz and SCS 960 kHz.

featurePriorities

Indicates priorities for features, such as RedCap, Slicing, SDT and MSG3-Repetitions for Coverage Enhancements. These priorities are used to determine which FeatureCombinationPreambles the UE shall use when a feature maps to more than one FeatureCombinationPreambles, as specified in TS 38.321 [3]. A lower value means a higher priority. The network does not signal the same priority for more than one feature. The network signals a priority for all feature that map to at least one FeatureCombinationPreambles.

IongBitmap

Bitmap when maximum number of SS/PBCH blocks per half frame equals to 64 as defined in TS 38.213 [13], clause 4.1.

Ite-CRS-ToMatchAround

Parameters to determine an LTE CRS pattern that the UE shall rate match around.

mediumBitmap

Bitmap when maximum number of SS/PBCH blocks per half frame equals to 8 as defined in TS 38.213 [13], clause 4.1.

n-TimingAdvanceOffset

The N_TA-Offset to be applied for all uplink transmissions on this serving cell. If the field is absent, the UE applies the value defined for the duplex mode and frequency range of this serving cell. See TS 38.133 [14], table 7.1.2-2.

rateMatchPatternToAddModList

Resources patterns which the UE should rate match PDSCH around. The UE rate matches around the union of all resources indicated in the rate match patterns. Rate match patterns defined here on cell level apply only to PDSCH of the same numerology (see TS 38.214 [19], clause 5.1.4.1). If a *RateMatchPattern* with the same *RateMatchPattern* in both *ServingCellConfig/ServingCellConfigCommon* and in SIB20/MCCH, the entire *RateMatchPattern* configuration, including the set of RBs/REs indicated by the patterns for the rate matching around, shall be the same and they are counted as a single rate match pattern in the total configured rate match patterns as defined in TS 38.214 [19].

shortBitmap

Bitmap when maximum number of SS/PBCH blocks per half frame equals to 4 as defined in TS 38.213 [13], clause 4.1.

ss-PBCH-BlockPower

Average EPRE of the resources elements that carry secondary synchronization signals in dBm that the NW used for SSB transmission, see TS 38.213 [13], clause 7.

ssb-periodicityServingCell

The SSB periodicity in ms for the rate matching purpose. If the field is absent, the UE applies the value ms5. (see TS 38.213 [13], clause 4.1)

ssb-PositionQCL

Indicates the QCL relation between SSB positions for this serving cell as specified in TS 38.213 [13], clause 4.1.

ssb-PositionsInBurst

For operation in licensed spectrum, indicates the time domain positions of the transmitted SS-blocks in a half frame with SS/PBCH blocks as defined in TS 38.213 [13], clause 4.1. The first/leftmost bit corresponds to SS/PBCH block index 0, the second bit corresponds to SS/PBCH block index 1, and so on. Value 0 in the bitmap indicates that the corresponding SS/PBCH block is not transmitted while value 1 indicates that the corresponding SS/PBCH block is transmitted. The network configures the same pattern in this field as in the corresponding field in ServingCellConfigCommonSIB.

For operation with shared spectrum channel access, the UE assumes that one or more SS/PBCH blocks indicated by *ssb-PositionsInBurst* may be transmitted within the discovery burst transmission window and have candidate SS/PBCH blocks indexes corresponding to SS/PBCH block indexes provided by *ssb-PositionsInBurst* (see TS 38.213 [13], clause 4.1). If the k-th bit of *ssb-PositionsInBurst* is set to 1, the UE assumes that one or more SS/PBCH blocks within the discovery burst transmission window with candidate SS/PBCH block indexes corresponding to SS/PBCH block index equal to k – 1 may be transmitted; if the kt-th bit is set to 0, the UE assumes that the corresponding SS/PBCH block(s) are not transmitted. The k-th bit is set to 0, where k > *ssb-PositionQCL* and the number of actually transmitted SS/PBCH blocks is not larger than the number of 1's in the bitmap. The network configures the same pattern in this field as in the corresponding field in *ServingCellConfigCommonSIB*. For operation with shared spectrum channel access in FR1, only *mediumBitmap* is used, and for FR2-2, *longBitmap* is used.

ssbSubcarrierSpacing

Subcarrier spacing of SSB.

Only the following values are applicable depending on the used frequency:

FR1: 15 or 30 kHz FR2-1: 120 or 240 kHz FR2-2: 120, 480, or 960 kHz

supplementaryUplinkConfig

The network configures this field only if *uplinkConfigCommon* is configured. If this field is absent, the UE shall release the *supplementaryUplinkConfig* and the *supplementaryUplink* configured in *ServingCellConfig* of this serving cell, if configured.

tdd-UL-DL-ConfigurationCommon

A cell-specific TDD UL/DL configuration, see TS 38.213 [13], clause 11.1.

Conditional Presence	Explanation
AbsFreqSSB	The field is absent when absoluteFrequencySSB in frequencyInfoDL is absent, otherwise the field is mandatory present.
HOAndServCellAdd	This field is mandatory present upon SpCell change (including path switch between a serving cell and a L2 U2N Relay UE) and upon serving cell (PSCell/SCell) addition. Otherwise, the field is absent.
HOAndServCellWithSSB	This field is mandatory present upon SpCell change and upon serving cell (SCell with SSB or PSCell) addition. Otherwise, the field is absent.
SharedSpectrum	This field is mandatory present if this cell operates with shared spectrum channel access in FR1. Otherwise, it is absent, Need R.
SharedSpectrum2	This field is optionally present if this cell operates with shared spectrum channel access in FR2-2, Need R. Otherwise, it is absent, Need R.
TDD	The field is optionally present, Need R, for TDD cells; otherwise it is absent.

ServingCellConfigCommonSIB

The IE ServingCellConfigCommonSIB is used to configure cell specific parameters of a UE's serving cell in SIB1.

ServingCellConfigCommonSIB information element

- -- ASN1START
- -- TAG-SERVINGCELLCONFIGCOMMONSIB-START

```
ServingCellConfigCommonSIB ::=
                                    SEOUENCE {
                                        DownlinkConfigCommonSIB,
    downlinkConfigCommon
                                        UplinkConfigCommonSIB
    uplinkConfigCommon
                                                                                                     OPTIONAL, -- Need R
    supplementaryUplink
                                        UplinkConfigCommonSIB
                                                                                                     OPTIONAL, -- Need R
    n-TimingAdvanceOffset
                                        ENUMERATED { n0, n25600, n39936 }
                                                                                                     OPTIONAL, -- Need S
    ssb-PositionsInBurst
                                        SEOUENCE {
        inOneGroup
                                            BIT STRING (SIZE (8)),
        groupPresence
                                            BIT STRING (SIZE (8))
                                                                                                     OPTIONAL -- Cond FR2-Only
    ssb-PeriodicityServingCell
                                        ENUMERATED {ms5, ms10, ms20, ms40, ms80, ms160},
    tdd-UL-DL-ConfigurationCommon
                                        TDD-UL-DL-ConfigCommon
                                                                                                     OPTIONAL, -- Cond TDD
    ss-PBCH-BlockPower
                                        INTEGER (-60..50),
    . . . ,
    ] ]
    channelAccessMode-r16
                                        CHOICE {
       dynamic
        semiStatic
                                            SemiStaticChannelAccessConfig-r16
                                                                                                     OPTIONAL, -- Cond SharedSpectrum
                                        ENUMERATED {ms0dot5, ms1, ms2, ms3, ms4, ms5}
                                                                                                     OPTIONAL, -- Need R
    discoveryBurstWindowLength-r16
    highSpeedConfig-r16
                                        HighSpeedConfig-r16
                                                                                                     OPTIONAL -- Need R
    ]],
    ] ]
    channelAccessMode2-r17
                                        ENUMERATED {enabled}
                                                                                                     OPTIONAL, -- Cond SharedSpectrum2
                                        ENUMERATED {ms0dot125, ms0dot25, ms0dot5, ms0dot75, ms1, ms1dot25} OPTIONAL, -- Need R
    discoveryBurstWindowLength-v1700
    highSpeedConfigFR2-r17
                                        HighSpeedConfigFR2-r17
                                                                                                     OPTIONAL, -- Need R
                                                                                                     OPTIONAL -- Need R
    uplinkConfigCommon-v1700
                                        UplinkConfigCommonSIB-v1700
    ]],
    ] ]
    enhancedMeasurementLEO-r17
                                        ENUMERATED {true}
                                                                                                     OPTIONAL -- Need R
    11
-- TAG-SERVINGCELLCONFIGCOMMONSIB-STOP
-- ASN1STOP
```

ServingCellConfigCommonSIB field descriptions

channelAccessMode

If present, this field indicates which channel access procedures to apply for operation with shared spectrum channel access as defined in TS 37.213 [48]. If the field is configured as "semiStatic", the UE shall apply the channel access procedures for semi-static channel occupancy as described in clause 4.3 in TS 37.213. If the field is configured as "dynamic", the UE shall apply the channel access procedures as defined in TS 37.213, clause 4.1 and 4.2.

channelAccessMode2

If present, this field indicates that the UE shall apply channel access procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2. If absent, the UE shall not apply any channel access procedure. The network always configures this field if channel access procedures are required for the serving cell within this region by regulations.

discoveryBurstWindowLength

Indicates the window length of the discovery burst in ms (see TS 37.213 [48]). The field discoveryBurstWindowLength-v1700 is applicable to SCS 480 kHz and SCS 960 kHz.

enhancedMeasurementLEO

If the field is present and UE supports the enhanced cell reselection requirements for NTN LEO in RRC_IDLE/RRC_INACTIVE, the UE shall apply the enhanced cell reselection requirements for NTN LEO as specified in TS 38.133 [14], clauses 4.2C.2.3 and 4.2C.2.4.

groupPresence

This field is present when maximum number of SS/PBCH blocks per half frame equals to 64 as defined in TS 38.213 [13], clause 4.1. The first/leftmost bit corresponds to the SS/PBCH index 0-7, the second bit corresponds to SS/PBCH block 8-15, and so on. Value 0 in the bitmap indicates that the SSBs according to *inOneGroup* are absent. Value 1 indicates that the SS/PBCH blocks are transmitted in accordance with *inOneGroup*.

inOneGroup

When maximum number of SS/PBCH blocks per half frame equals to 4 as defined in TS 38.213 [13], clause 4.1, only the 4 leftmost bits are valid; the UE ignores the 4 rightmost bits. When maximum number of SS/PBCH blocks per half frame equals to 8 as defined in TS 38.213 [13], clause 4.1, all 8 bits are valid. The first/ leftmost bit corresponds to SS/PBCH block index 0, the second bit corresponds to SS/PBCH block index 1, and so on. When maximum number of SS/PBCH blocks per half frame equals to 64 as defined in TS 38.213 [13], clause 4.1, all 8 bit are valid; The first/ leftmost bit corresponds to the first SS/PBCH block index in the group (i.e., to SSB index 0, 8, and so on); the second bit corresponds to the second SS/PBCH block index in the group (i.e., to SSB index 1, 9, and so on), and so on. Value 0 in the bitmap indicates that the corresponding SS/PBCH block is not transmitted while value 1 indicates that the corresponding SS/PBCH block is transmitted.

n-TimingAdvanceOffset

The N_TA-Offset to be applied for random access on this serving cell. If the field is absent, the UE applies the value defined for the duplex mode and frequency range of this serving cell. See TS 38.133 [14], table 7.1.2-2.

ssb-PositionsInBurst

Time domain positions of the transmitted SS-blocks in an SS-burst as defined in TS 38.213 [13], clause 4.1.

For operation with shared spectrum channel access in FR1, only *inOneGroup* is used and the UE interprets this field same as *mediumBitmap* in *ServingCellConfigCommon*. The UE assumes that a bit in *inOneGroup* at position $k > N_{SSB}^{QCL}$ is 0, where N_{SSB}^{QCL} is obtained from *MIB* as specified in TS 38.213 [13], clause 4.1. For operation with shared spectrum channel access in FR2-2, the m-th bit in *groupPresence* is set to 0 for m > N_{SSB}^{QCL} /8, where N_{SSB}^{QCL} is obtained from *MIB* as specified in TS 38.213 [13], clause 4.1.

ss-PBCH-BlockPower

Average EPRE of the resources elements that carry secondary synchronization signals in dBm that the NW used for SSB transmission, see TS 38.213 [13], clause 7.

Conditional Presence	Explanation
FR2-Only	This field is mandatory present for an FR2 carrier frequency. It is absent otherwise and UE releases any configured value.
SharedSpectrum	This field is mandatory present if this cell operates with shared spectrum channel access in FR1. Otherwise, it is absent, Need R.
SharedSpectrum2	This field is optionally present if this cell operates with shared spectrum channel access in FR2-2, Need R. Otherwise, it is absent, Need R.
TDD	The field is optionally present, Need R, for TDD cells; otherwise it is absent.

Shortl-RNTI-Value

The IE ShortI-RNTI-Value is used to identify the suspended UE context of a UE in RRC_INACTIVE using fewer bits compared to I-RNTI-Value.

Shortl-RNTI-Value information element

```
-- ASN1START
-- TAG-SHORTI-RNTI-VALUE-START

ShortI-RNTI-Value ::= BIT STRING (SIZE(24))
-- TAG-SHORTI-RNTI-VALUE-STOP
-- ASN1STOP
```

ShortMAC-I

The IE *ShortMAC-I* is used to identify and verify the UE at RRC connection re-establishment. The 16 least significant bits of the MAC-I calculated using the AS security configuration of the source PCell, as specified in 5.3.7.4.

ShortMAC-I information element

```
-- ASN1START
-- TAG-SHORTMAC-I-START

ShortMAC-I ::= BIT STRING (SIZE (16))
-- TAG-SHORTMAC-I-STOP
-- ASN1STOP
```

- SINR-Range

The IE SINR-Range specifies the value range used in SINR measurements and thresholds. For measurements, integer value for SINR measurements is according to Table 10.1.16.1-1 in TS 38.133 [14]. For thresholds, the actual value is (IE value -46) / 2 dB.

SINR-Range information element

```
-- ASN1START
-- TAG-SINR-RANGE-START

SINR-Range ::= INTEGER(0..127)

-- TAG-SINR-RANGE-STOP
-- ASN1STOP
```

SI-RequestConfig

The IE SI-RequestConfig contains configuration for Msg1 based SI request.

SI-RequestConfig information element

```
-- ASN1START
-- TAG-SI-REOUESTCONFIG-START
SI-RequestConfig ::=
                                  SEOUENCE {
   rach-OccasionsSI
                                      SEOUENCE {
       rach-ConfigSI
                                          RACH-ConfigGeneric,
       ssb-perRACH-Occasion
                                          ENUMERATED {one Eighth, one Fourth, one Half, one, two, four, eight, sixteen}
                                                                                                       OPTIONAL, -- Need R
   si-RequestPeriod
                                      ENUMERATED {one, two, four, six, eight, ten, twelve, sixteen}
                                                                                                       OPTIONAL, -- Need R
   si-RequestResources
                                      SEQUENCE (SIZE (1..maxSI-Message)) OF SI-RequestResources
                                  SEQUENCE {
SI-RequestResources ::=
   ra-PreambleStartIndex
                                 INTEGER (0..63).
   ra-AssociationPeriodIndex
                                     INTEGER (0..15)
                                                                                                       OPTIONAL, -- Need R
   ra-ssb-OccasionMaskIndex
                                     INTEGER (0..15)
                                                                                                       OPTIONAL -- Need R
-- TAG-SI-REQUESTCONFIG-STOP
-- ASN1STOP
```

SI-RequestConfig field descriptions

rach-OccasionsSI

Configuration of dedicated RACH Occasions for SI. If the field is absent, the UE uses the corresponding parameters configured in *rach-ConfigCommon* of the initial uplink BWP.

si-RequestPeriod

Periodicity of the SI-Request configuration in number of association periods.

si-RequestResources

If there is only one entry in the list, the configuration is used for all SI messages for which si-BroadcastStatus or posSI-BroadcastStatus is set to notBroadcasting. Otherwise:

- If si-SchedulingInfo-v1700 is not present, the 1st entry in the list corresponds to the first SI message in schedulingInfoList or posSchedulingInfoList for which si-BroadcastStatus or posSI-BroadcastStatus is set to notBroadcastStatus is set to notBroadcastStatus is set to notBroadcastStatus is set to notBroadcastStatus is set to notBroadcasting and so on. Change of si-RequestResources should not result in system information change notification.
- If si-SchedulingInfo-v1700 is present and SI-RequestConfig is configured in SI-SchedulingInfo for on-demand SI request, the UE generates a list of concatenated SI messages by appending the SI messages containing type1 SIB configured by schedulingInfoList2 in si-SchedulingInfo-v1700 to the SI messages configured by schedulingInfoList in si-SchedulingInfo. The 1st entry in the list corresponds to the first SI message for which si-BroadcastStatus is set to notBroadcasting, 2nd entry in the list corresponds to the second SI message for which si-BroadcastStatus is set to notBroadcasting and so on.
- If si-SchedulingInfo-v1700 is present and SI-RequestConfig is configured in PosSI-SchedulingInfo for on-demand SI request, the UE generates a list of concatenated SI messages by appending the SI messages containing type2 SIB configured by schedulingInfoList2 in si-SchedulingInfo-v1700 to the SI messages configured by posSchedulingInfoList in posSI-SchedulingInfo. The 1st entry in the list corresponds to the first SI message for which posSI-BroadcastStatus or si-BroadcastStatus is set to notBroadcasting, 2nd entry in the list corresponds to the second SI message for which posSI-BroadcastStatus or si-BroadcastStatus is set to notBroadcasting and so on.

SI-RequestResources field descriptions

ra-AssociationPeriodIndex

Index of the association period in the *si-RequestPeriod* in which the UE can send the SI request for SI message(s) corresponding to this *SI-RequestResources*, using the preambles indicated by *ra-PreambleStartIndex* and rach occasions indicated by *ra-ssb-OccasionMaskIndex*.

ra-PreambleStartIndex

If N SSBs are associated with a RACH occasion, where N > 1, for the i-th SSB (i=0, ..., N-1) the preamble with preamble index = ra-PreambleStartIndex + i is used for SI request; For N < 1, the preamble with preamble index = ra-PreambleStartIndex is used for SI request.

SI-SchedulingInfo

The IE SI-SchedulingInfo contains information needed for acquisition of SI messages.

SI-SchedulingInfo information element

```
-- ASN1START
-- TAG-SI-SCHEDULINGINFO-START
SI-SchedulingInfo ::=
                                    SEQUENCE {
    schedulingInfoList
                                        SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo,
    si-WindowLength
                                        ENUMERATED {s5, s10, s20, s40, s80, s160, s320, s640, s1280, s2560-v1710, s5120-v1710 },
    si-RequestConfig
                                        SI-RequestConfig
                                                                                                        OPTIONAL, -- Cond MSG-1
    si-RequestConfigSUL
                                        SI-RequestConfig
                                                                                                        OPTIONAL, -- Cond SUL-MSG-1
                                                                                                        OPTIONAL, -- Need R
                                       BIT STRING (SIZE (24))
    systemInformationAreaID
SchedulingInfo ::=
                                    SEQUENCE {
                                        ENUMERATED {broadcasting, notBroadcasting},
    si-BroadcastStatus
                                        ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},
    si-Periodicity
    sib-MappingInfo
                                        SIB-Mapping
SI-SchedulingInfo-v1700 ::=
                                    SEOUENCE {
    schedulingInfoList2-r17
                                        SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo2-r17,
    si-RequestConfigRedCap-r17
                                       SI-RequestConfig
                                                                                                       OPTIONAL -- Cond REDCAP-MSG-1
SchedulingInfo2-r17 ::=
                                    SEQUENCE {
                                        ENUMERATED {broadcasting, notBroadcasting},
    si-BroadcastStatus-r17
    si-WindowPosition-r17
                                        INTEGER (1..256),
                                       ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},
    si-Periodicity-r17
    sib-MappingInfo-r17
                                        SIB-Mapping-v1700
SIB-Mapping ::=
                                    SEQUENCE (SIZE (1..maxSIB)) OF SIB-TypeInfo
SIB-Mapping-v1700 ::=
                                    SEQUENCE (SIZE (1..maxSIB)) OF SIB-TypeInfo-v1700
SIB-TypeInfo ::=
                                    SEQUENCE {
                                        ENUMERATED {sibType2, sibType3, sibType4, sibType5, sibType6, sibType7, sibType8, sibType9,
    type
```

```
sibType10-v1610, sibType11-v1610, sibType12-v1610, sibType13-v1610,
                                                     sibType14-v1610, spare3, spare2, spare1,...},
    valueTag
                                        INTEGER (0..31)
                                                                                                        OPTIONAL. -- Cond SIB-TYPE
    areaScope
                                        ENUMERATED {true}
                                                                                                        OPTIONAL -- Need S
SIB-TypeInfo-v1700 ::=
                                    SEOUENCE {
    sibTvpe-r17
                                        CHOICE {
       type1-r17
                                            ENUMERATED {sibType15, sibType16, sibType17, sibType18, sibType19, sibType20, sibType21,
                                                        spare9, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1,...},
        type2-r17
                                            SEQUENCE {
                                                ENUMERATED {posSibType1-9, posSibType1-10, posSibType2-24, posSibType2-25,
           posSibType-r17
                                                            posSibType6-4, posSibType6-5, posSibType6-6, spare9, spare8, spare7, spare6,
                                                            spare5, spare4, spare3, spare2, spare1,...},
           encrypted-r17
                                                ENUMERATED { true }
                                                                                                        OPTIONAL, -- Need R
           gnss-id-r17
                                                GNSS-ID-r16
                                                                                                        OPTIONAL, -- Need R
           sbas-id-r17
                                                                                                        OPTIONAL -- Need R
                                                SBAS-ID-r16
    valueTag-r17
                                            INTEGER (0..31)
                                                                                                        OPTIONAL, -- Cond NonPosSIB
    areaScope-r17
                                            ENUMERATED {true}
                                                                                                        OPTIONAL -- Need S
-- TAG-SI-SCHEDULINGINFO-STOP
```

SchedulingInfo field descriptions

areaScope

-- ASN1STOP

Indicates that a SIB is area specific. If the field is absent, the SIB is cell specific.

si-BroadcastStatus

Indicates if the SI message is being broadcasted or not. Change of *si-BroadcastStat*us should not result in system information change notifications in Short Message transmitted with P-RNTI over DCI (see clause 6.5). The value of the indication is valid until the end of the BCCH modification period when set to *broadcasting*. When *SIB19* is scheduled, the si-*BroadcastStatus* for the mapped *SIB19* is set to broadcasting.

If si-SchedulingInfo-v1700 is present, the total number of SI messages with posSI-BroadcastStatus and si-BroadcastStatus set to notBroadcasting in the list of concatenated SI messages configured by schedulingInfoList in si-SchedulingInfo-v1700 does not exceed the limit of maxSI-Message when posSI-RequestConfig or posSI-RequestConfigRedCap or posSI-RequestConfigSUL is configured.

si-Periodicity

Periodicity of the SI-message in radio frames. Value rf8 corresponds to 8 radio frames, value rf16 corresponds to 16 radio frames, and so on.

SI-SchedulingInfo field descriptions

si-RequestConfig

Configuration of Msg1 resources that the UE uses for requesting SI-messages for which si-BroadcastStatus is set to notBroadcasting.

si-RequestConfigRedCap

Configuration of Msg1 resources for initialUplinkBWP-RedCap that the RedCap UE uses for requesting SI-messages for which si-BroadcastStatus is set to notBroadcasting.

si-RequestConfigSUL

Configuration of Msg1 resources that the UE uses for requesting SI-messages for which si-BroadcastStatus is set to notBroadcasting.

si-WindowLength

The length of the SI scheduling window. Value *s5* corresponds to 5 slots, value *s10* corresponds to 10 slots and so on. The network always configures *si-WindowLength* to be shorter than or equal to the *si-Periodicity*. The values *s2560-v1710* and *s5120-v1710* are only applicable for SCS 480 kHz.

svstemInformationArealD

Indicates the system information area that the cell belongs to, if any. Any SIB with areaScope within the SI is considered to belong to this systemInformationAreaID. The systemInformationAreaID is unique within a PLMN/SNPN.

SchedulingInfo2 field descriptions

encrypted

The presence of this field indicates that the pos-sib-type is encrypted as specified in TS 37.355 [49].

gnss-id

The presence of this field indicates that the positioning SIB type is for a specific GNSS. Indicates a specific GNSS (see also TS 37.355 [49])

posSibType

The posSIBs as defined in TS 37.355 [49] mapped to SI for scheduling using schedulingInfoList2.

sbas-id

The presence of this field indicates that the positioning SIB type is for a specific SBAS. Indicates a specific SBAS (see also TS 37.355 [49]).

si-WindowPosition

This field indicates the SI window position of the associated SI-message. The network provides *si-WindowPosition* in an ascending order, i.e. *si-WindowPosition* in the subsequent entry in *schedulingInfoList2* has always value higher than in the previous entry of *schedulingInfoList2*. The network configures this field in a way that ensures that SI messages scheduled by *schedulingInfoList* and/or *posSchedulingInfoList* do not overlap with SI messages scheduled by *schedulingInfoList2*.

sib-MappingInfo

Indicates which SIBs or posSIBs are contained in the SI message.

type1, type2

The SIBs/posSIBs mapped to SI for scheduling using schedulingInfoList2.

Conditional presence	Explanation
MSG-1	The field is optionally present, Need R, if si-BroadcastStatus is set to notBroadcasting for any SI-message included in SchedulingInfo. It is absent
	otherwise.
SIB-TYPE	The field is mandatory present if the SIB type is different from SIB6, SIB7 or SIB8. For SIB6, SIB7 and SIB8 it is absent.
NonPosSIB	The field is mandatory present if the SIB type is type1. For type2 it is absent.
SUL-MSG-1	The field is optionally present, Need R, if supplementaryUplink is configured in ServingCellConfigCommonSIB and if si-BroadcastStatus is set to
	notBroadcasting for any SI-message included in SchedulingInfo. It is absent otherwise.
REDCAP-MSG-1	The field is optionally present, Need R, if initialUplinkBWP-RedCap is configured in UplinkConfigCommonSIB and if si-BroadcastStatus is set to
	notBroadcasting for any SI-message included in SchedulingInfo. It is absent otherwise.

SK-Counter

The IE SK-Counter is a counter used upon initial configuration of SN security for NR-DC and NE-DC, as well as upon refresh of S-K_{gNB} or S-K_{eNB} based on the current or newly derived K_{gNB} during RRC Resume or RRC Reconfiguration, as defined in TS 33.501 [11].

```
-- ASN1START
-- TAG-SKCOUNTER-START

SK-Counter ::= INTEGER (0..65535)

-- TAG-SKCOUNTER-STOP
-- ASN1STOP
```

SlotFormatCombinationsPerCell

The IE SlotFormatCombinationsPerCell is used to configure the SlotFormatCombinations applicable for one serving cell (see TS 38.213 [13], clause 11.1.1).

SlotFormatCombinationsPerCell information element

```
-- ASN1START
-- TAG-SLOTFORMATCOMBINATIONSPERCELL-START
SlotFormatCombinationsPerCell ::= SEQUENCE {
    servingCellId
                                        ServCellIndex,
    subcarrierSpacing
                                        SubcarrierSpacing,
    subcarrierSpacing2
                                        SubcarrierSpacing
                                                                                                                  OPTIONAL, -- Need R
    slotFormatCombinations
                                        SEQUENCE (SIZE (1..maxNrofSlotFormatCombinationsPerSet)) OF SlotFormatCombination
                                                                                                                  OPTIONAL, -- Need M
                                                                                                                  OPTIONAL, -- Need M
    positionInDCI
                                        INTEGER(0..maxSFI-DCI-PayloadSize-1)
    enableConfiguredUL-r16
                                        ENUMERATED {enabled}
                                                                                                                  OPTIONAL -- Need R
SlotFormatCombination ::=
                                    SEQUENCE {
    slotFormatCombinationId
                                        SlotFormatCombinationId,
    slotFormats
                                        SEQUENCE (SIZE (1..maxNrofSlotFormatsPerCombination)) OF INTEGER (0..255)
SlotFormatCombinationId ::=
                                    INTEGER (0..maxNrofSlotFormatCombinationsPerSet-1)
-- TAG-SLOTFORMATCOMBINATIONSPERCELL-STOP
-- ASN1STOP
```

SlotFormatCombination field descriptions

slotFormatCombinationId

This ID is used in the DCI payload to dynamically select this SlotFormatCombination (see TS 38.213 [13], clause 11.1.1).

slotFormats

Slot formats that occur in consecutive slots in time domain order as listed here (see TS 38.213 [13], clause 11.1.1 and TS 38.213 [13], clause 14 for IAB-MT).

SlotFormatCombinationsPerCell field descriptions

enableConfiguredUL

If configured, the UE is allowed to transmit uplink signals/channels (SRS, PUCCH, CG-PUSCH) in the set of symbols of the slot when the UE does not detect a DCI format 2_0 providing a slot format for the set of symbols (see TS 38.213 [13], 11.1.1). This field is applicable only if *cg-RetransmissionTimer-r16* is configured.

positionInDCI

The (starting) position (bit) of the slotFormatCombinationId (SFI-Index) for this serving cell (servingCellId) within the DCI payload (see TS 38.213 [13], clause 11.1.1).

servingCellId

The ID of the serving cell for which the slotFormatCombinations are applicable.

slotFormatCombinations 5 1 1

A list with SlotFormatCombinations. Each SlotFormatCombination comprises of one or more SlotFormats (see TS 38.211 [16], clause 4.3.2). The total number of slotFormats in the slotFormatCombinations list does not exceed 512.

subcarrierSpacing2

Reference subcarrier spacing for a Slot Format Combination on an FDD or SUL cell (see TS 38.213 [13], clause 11.1.1). For FDD, subcarrierSpacing (SFI-scs) is the reference SCS for DL BWP and subcarrierSpacing2 (SFI-scs2) is the reference SCS for UL BWP. For SUL, *subcarrierSpacing* (SFI-scs2) is the reference SCS for non-SUL carrier and *subcarrierSpacing2* (SFI-scs2) is the reference SCS for SUL carrier. The network configures a value that is smaller than or equal to any SCS of configured BWPs of the serving cell that the command applies to. And the network configures a value that is smaller than or equal to the SCS of the serving cell which the UE monitors for SFI indications.

subcarrierSpacing

Reference subcarrier spacing for this Slot Format Combination. The network configures a value that is smaller than or equal to any SCS of configured BWPs of the serving cell that the command applies to. And the network configures a value that is smaller than or equal to the SCS of the serving cell which the UE monitors for SFI indications (see TS 38.213 [13], clause 11.1.1).

SlotFormatIndicator

The IE SlotFormatIndicator is used to configure monitoring a Group-Common-PDCCH for Slot-Format-Indicators (SFI).

SlotFormatIndicator information element

```
availableRB-SetsToReleaseList-r16 SEQUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroup)) OF ServCellIndex
                                                                                                                       OPTIONAL, -- Need N
    switchTriggerToAddModList-r16
                                    SEQUENCE (SIZE(1..4)) OF SearchSpaceSwitchTrigger-r16
                                                                                                                       OPTIONAL, -- Need N
    switchTriggerToReleaseList-r16
                                    SEQUENCE (SIZE(1..4)) OF ServCellIndex
                                                                                                                       OPTIONAL, -- Need N
    co-DurationsPerCellToAddModList-r16 SEOUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroup)) OF CO-DurationsPerCell-r16
                                                                                                                       OPTIONAL, -- Need N
    co-DurationsPerCellToReleaseList-r16 SEQUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroup)) OF ServCellIndex
                                                                                                                       OPTIONAL -- Need N
    ]],
    П
    switchTriggerToAddModListSizeExt-r16 SEQUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroupMinus4-r16)) OF
       SearchSpaceSwitchTrigger-r16 OPTIONAL, -- Need N
    ServCellIndex
                                    OPTIONAL -- Need N
    11,
    11
    co-DurationsPerCellToAddModList-r17 SEQUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroup)) OF CO-DurationsPerCell-r17 OPTIONAL -- Need N
    ]]
CO-DurationsPerCell-r16 ::=
                            SEOUENCE {
    servingCellId-r16
                                ServCellIndex,
   positionInDCI-r16
                                INTEGER(0..maxSFI-DCI-PayloadSize-1),
    subcarrierSpacing-r16
                                SubcarrierSpacing,
    co-DurationList-r16
                                SEQUENCE (SIZE(1..64)) OF CO-Duration-r16
CO-DurationsPerCell-r17 ::=
                            SEOUENCE {
    servingCellId-r17
                                ServCellIndex,
   positionInDCI-r17
                                INTEGER(0..maxSFI-DCI-PayloadSize-1),
    subcarrierSpacing-r17
                                SubcarrierSpacing,
    co-DurationList-r17
                                SEQUENCE (SIZE(1..64)) OF CO-Duration-r17
CO-Duration-r16 ::=
                     INTEGER (0..1120)
CO-Duration-r17 ::=
                     INTEGER (0..4480)
AvailableRB-SetsPerCell-r16 ::=
                                SEOUENCE {
   servingCellId-r16
                                    ServCellIndex,
   positionInDCI-r16
                                    INTEGER(0..maxSFI-DCI-PayloadSize-1)
SearchSpaceSwitchTrigger-r16 ::=
                                SEOUENCE {
    servingCellId-r16
                                     ServCellIndex,
   positionInDCI-r16
                                    INTEGER(0..maxSFI-DCI-PayloadSize-1)
-- TAG-SLOTFORMATINDICATOR-STOP
-- ASN1STOP
```

SlotFormatIndicator field descriptions

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availableRB-SetsToAddModList

A list of AvailableRB-SetsPerCell objects (see TS 38.213 [13], clause 11.1.1).

co-DurationsPerCellToAddModList

A list of *CO-DurationsPerCell* objects. If not configured, the UE uses the slot format indicator (SFI), if available, to determine the channel occupancy duration (see TS 38.213 [13], clause 11.1.1).

co-DurationsPerCellToReleaseList

A list of CO-DurationsPerCell objects to be released. An entry created using co-DurationsPerCellToAddModList-r16 or co-DurationsPerCellToAddModList-r17 can be deleted using co-DurationsPerCellToReleaseList.

dci-PayloadSize

Total length of the DCI payload scrambled with SFI-RNTI (see TS 38.213 [13], clause 11.1.1).

sfi-RNTI

RNTI used for SFI on the given cell (see TS 38.213 [13], clause 11.1.1).

slotFormatCombToAddModList

A list of SlotFormatCombinations for the UE's serving cells (see TS 38.213 [13], clause 11.1.1).

switchTriggerToAddModList, switchTriggerToAddModListSizeExt

A list of SearchSpaceSwitchTrigger objects. Each SearchSpaceSwitchTrigger object provides position in DCI of the bit field indicating search space switching flag for a serving cell or, if cellGroupsForSwitchList is configured, group of serving cells (see TS 38.213 [13], clause 10.4). If cellGroupsForSwitchList is configured, only one of the cells belonging to the same cell group is added/modified, and the configuration applies to all cells belonging to the cellGroupsForSwitchList (see TS 38.213 [13], clause 10.4). The network configures more than 4 SearchSpaceSwitchTrigger objects only if cellGroupsForSwitchList is not configured. The UE shall consider entries in switchTriggerToAddModList and in switchTriggerToAddModListSizeExt as a single list, i.e. an entry created using switchTriggerToAddModList can be modified using switchTriggerToAddModListSizeExt and vice-versa.

switchTriggerToReleaseModList, switchTriggerToReleaseListSizeExt

A list of SearchSpaceSwitchTriggers to be released. If cellGroupsForSwitchList is configured, the SearchSpaceSwitchTrigger is released for all serving cells belonging to the same CellGroupForSwitch. The UE shall consider entries in switchTriggerToReleaseList and in switchTriggerToReleaseListSizeExt as a single list, i.e. an entry created using switchTriggerToAddModList or switchTriggerToAddModListSizeExt can be deleted using switchTriggerToReleaseList or switchTriggerToReleaseListSizeExt.

AvailableRB-SetsPerCell field descriptions

positionInDCI

The (starting) position of the bits within DCI payload indicating the availability of the RB sets of a serving cell (see TS 38.213 [13], clause 11.1.1).

servingCellId

The ID of the serving cell for which the configuration is applicable.

CO-DurationsPerCell field descriptions

co-DurationList

A list of Channel Occupancy duration in symbols.

The maximum duration that can be configured for the following SCS:

- 15 kHz: 280.
- 30 kHz: 560.
- 60 kHz: 1120.
- 120 kHz: 560.
- 480 kHz: 2240.
- 960 kHz: 4480.

positionInDCI

Position in DCI of the bit field indicating Channel Occupancy duration for UE's serving cells (see TS 38.213 [13], clause 11.1.1).

servingCellId

The ID of the serving cell for which the configuration is applicable.

subcarrierSpacing

Reference subcarrier spacing for the list of Channel Occupancy durations (see TS 38.213 [13], clause 11.1.1).

SearchSpaceSwitchTrigger field descriptions

positionInDCI

The position of the bit within DCI payload containing a search space switching flag (see TS 38.213 [13], clause 11.1.1).

servingCellId

The ID of the serving cell for which the configuration is applicable or the group of serving cells as indicated by CellGroupsForSwitch-r16 containing this servingCellId.

– S-NSSAI

The IE S-NSSAI (Single Network Slice Selection Assistance Information) identifies a Network Slice end to end and comprises a slice/service type and a slice differentiator, see TS 23.003 [21].

S-NSSAI information element

```
-- ASN1START
-- TAG-S-NSSAI-START

S-NSSAI ::= CHOICE{
    sst BIT STRING (SIZE (8)),
    sst-SD BIT STRING (SIZE (32))
}

-- TAG-S-NSSAI-STOP
-- ASN1STOP
```

S-NSSAI field descriptions sst Indicates the S-NSSAI consisting of Slice/Service Type, see TS 23.003 [21]. sst-SD Indicates the S-NSSAI consisting of Slice/Service Type and Slice Differentiator, see TS 23.003 [21].

SpeedStateScaleFactors

The IE SpeedStateScaleFactors concerns factors, to be applied when the UE is in medium or high speed state, used for scaling a mobility control related parameter.

SpeedStateScaleFactors information element

```
-- ASN1START
-- TAG-SPEEDSTATESCALEFACTORS-START

SpeedStateScaleFactors ::= SEQUENCE {
    sf-Medium ENUMERATED {oDot25, oDot5, oDot75, 1Dot0},
    sf-High ENUMERATED {oDot25, oDot5, oDot75, 1Dot0},
    -- TAG-SPEEDSTATESCALEFACTORS-STOP
-- ASN1STOP
```

SpeedStateScaleFactors field descriptions

sf-High

The concerned mobility control related parameter is multiplied with this factor if the UE is in High Mobility state as defined in TS 38.304 [20]. Value *oDot25* corresponds to 0.25, value *oDot5* corresponds to 0.5, *oDot75* corresponds to 0.75 and so on.

sf-Medium

The concerned mobility control related parameter is multiplied with this factor if the UE is in Medium Mobility state as defined in TS 38.304 [20]. Value *oDot25* corresponds to 0.25, value *oDot5* corresponds to 0.5, value *oDot75* corresponds to 0.75, and so on.

– SPS-Config

The IE SPS-Config is used to configure downlink semi-persistent transmission. Multiple Downlink SPS configurations may be configured in one BWP of a serving cell.

SPS-Config information element

```
ENUMERATED { qam64LowSE }
    mcs-Table
    ] ]
    sps-ConfigIndex-r16
                                    SPS-ConfigIndex-r16
    harg-ProcID-Offset-r16
                                    INTEGER (0..15)
    periodicityExt-r16
                                    INTEGER (1..5120)
    harg-CodebookID-r16
                                    INTEGER (1..2)
    pdsch-AggregationFactor-r16
                                    ENUMERATED {n1, n2, n4, n8 }
    ] ]
    sps-HARQ-Deferral-r17
                                    INTEGER (1..32)
    n1PUCCH-AN-PUCCHsSCell-r17
                                    PUCCH-ResourceId
                                    INTEGER (1..40960)
    periodicityExt-r17
    nrofHARQ-Processes-v1710
                                    INTEGER (9..32)
                                    INTEGER (16..31)
    harq-ProcID-Offset-v1700
    ]]
-- TAG-SPS-CONFIG-STOP
-- ASN1STOP
```

```
OPTIONAL, -- Need S

OPTIONAL, -- Cond SPS-List
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL -- Need S

OPTIONAL, -- Need R
OPTIONAL -- Need R
```

SPS-Config field descriptions

harg-CodebookID

Indicates the HARQ-ACK codebook index for the corresponding HARQ-ACK codebook for SPS PDSCH and ACK for SPS PDSCH release.

harg-ProcID-Offset

Indicates the offset used in deriving the HARQ process IDs, see TS 38.321 [3], clause 5.3.1.

mcs-Table

Indicates the MCS table the UE shall use for DL SPS (see TS 38.214 [19], clause 5.1.3.1. If present, the UE shall use the MCS table of low-SE 64QAM table indicated in Table 5.1.3.1-3 of TS 38.214 [19]. If this field is absent and field mcs-table in PDSCH-Config is set to 'qam256' and the activating DCI is of format 1_1, the UE applies the 256QAM table indicated in Table 5.1.3.1-2 of TS 38.214 [19]. If this field is absent and the field mcs-Table-r17 in PDSCH-Config is set to 'qam1024' and the activating DCI is format 1_1, the UE applies the 1024QAM table indicated in Table 5.1.3.1-4 of TS 38.214 [19]. Otherwise, the UE applies the non-low-SE 64QAM table indicated in Table 5.1.3.1-1 of TS 38.214 [19].

n1PUCCH-AN

HARQ resource for PUCCH for DL SPS. The network configures the resource either as format0 or format1. The actual *PUCCH-Resource* is configured in *PUCCH-Config* and referred to by its ID. See TS 38.213 [13], clause 9.2.3.

n1PUCCH-AN-PUCCHsSCell

HARQ resource for PUCCH on PUCCH switching SCell (sSCell) for DL SPS. The network configures the resource either as format 0 or format 1. The actual PUCCH-Resource is configured in PUCCH-Config of the PUCCH sSCell and referred to by its ID. See TS 38.213 [13], clause 9.2.3.

nrofHARQ-Processes

Number of configured HARQ processes for SPS DL (see TS 38.321 [3], clause 5.8.1). If UE is configured with *nrofHARQ-Processes-v1710* UE shall ignore *nrofHARQ-Processes* (without suffix).

pdsch-AggregationFactor

Number of repetitions for SPS PDSCH (see TS 38.214 [19], clause 5.1.2.1). When the field is absent, the UE applies PDSCH aggregation factor of PDSCH-Config.

periodicity

Periodicity for DL SPS (see TS 38.214 [19] and TS 38.321 [3], clause 5.8.1).

periodicityExt

This field is used to calculate the periodicity for DL SPS (see TS 38.214 [19] and see TS 38.321 [3], clause 5.8.1). If this field is present, the field periodicity is ignored.

The following periodicities are supported depending on the configured subcarrier spacing [ms]:

15 kHz: periodicityExt, where periodicityExt has a value between 1 and 640.
30 kHz: 0.5 x periodicityExt, where periodicityExt has a value between 1 and 1280.
60 kHz with normal CP. 0.25 x periodicityExt, where periodicityExt has a value between 1 and 2560.
60 kHz with ECP: 0.25 x periodicityExt, where periodicityExt has a value between 1 and 2560.

120 kHz: 0.125 x periodicityExt, where periodicityExt has a value between 1 and 5120.
480 kHz: 0.03125 x periodicityExt, where periodicityExt has a value between 1 and 20480.
960 kHz: 0.015625 x periodicityExt, where periodicityExt has a value between 1 and 40960.

periodicityExt-r17 is only applicable for SCS 480 kHz and 960 kHz.

sps-ConfigIndex

Indicates the index of one of multiple SPS configurations.

sps-HARQ-Deferral

Indicates the maximum number of slots or subslots the transmission of DL SPS HARQ-ACK in a slot or subslot can be deferred (see TS 38.213 [13], clause 9.2.5.4).

Conditional Presence	Explanation
SPS-List	The field is mandatory present when included in sps-ConfigToAddModList-r16 or sps-ConfigMulticastToAddModList-r17,
	otherwise the field is absent.

SPS-ConfigIndex

The IE SPS-ConfigIndex is used to indicate the index of one of multiple DL SPS configurations in one BWP.

SPS-ConfigIndex information element

```
-- ASN1START
-- TAG-SPS-CONFIGINDEX-START

SPS-ConfigIndex-r16 ::= INTEGER (0.. maxNrofSPS-Config-1-r16)
-- TAG-SPS-CONFIGINDEX-STOP
-- ASN1STOP
```

SPS-PUCCH-AN

The IE SPS-PUCCH-AN is used to indicate a PUCCH resource for HARQ ACK and configure the corresponding maximum payload size for the PUCCH resource.

SPS-PUCCH-AN information element

SPS-PUCCH-AN field descriptions

maxPayloadSize

Indicates the maximum payload size for the corresponding PUCCH resource ID.

sps-PUCCH-AN-ResourceID

Indicates the PUCCH resource ID

SPS-PUCCH-AN-List

The IE SPS-PUCCH-AN-List is used to configure the list of PUCCH resources per HARQ ACK codebook

SPS-PUCCH-AN-List information element

-- ASN1START

```
-- TAG-SPS-PUCCH-AN-LIST-START

SPS-PUCCH-AN-List-r16 ::= SEQUENCE (SIZE(1..4)) OF SPS-PUCCH-AN-r16

-- TAG-SPS-PUCCH-AN-LIST-STOP
-- ASN1STOP
```

- SRB-Identity

The IE SRB-Identity is used to identify a Signalling Radio Bearer (SRB) used by a UE.

SRB-Identity information element

```
-- ASN1START
-- TAG-SRB-IDENTITY-START

SRB-Identity ::= INTEGER (1..3)

SRB-Identity-v1700 ::= INTEGER (4)

-- TAG-SRB-IDENTITY-STOP
-- ASN1STOP
```

SRS-CarrierSwitching

The IE SRS-CarrierSwitching is used to configure for SRS carrier switching when PUSCH is not configured and independent SRS power control from that of PUSCH.

SRS-CarrierSwitching information element

```
-- ASN1START
-- TAG-SRS-CARRIERSWITCHING-START
SRS-CarrierSwitching ::= SEQUENCE {
   srs-SwitchFromServCellIndex INTEGER (0..31)
srs-SwitchFromCarrier ENUMERATED {sUL, nUL},
srs-TPC-PDCCH-Group CHOICE {
                                                                                                                        OPTIONAL, -- Need M
        typeA
                                          SEQUENCE (SIZE (1..32)) OF SRS-TPC-PDCCH-Config,
        typeB
                                              SRS-TPC-PDCCH-Config
                                                                                                                        OPTIONAL, -- Need M
                                          SEQUENCE (SIZE (1..maxNrofServingCells)) OF ServCellIndex
    monitoringCells
                                                                                                                        OPTIONAL, -- Need M
SRS-TPC-PDCCH-Config ::=
    srs-CC-SetIndexlist
                                          SEQUENCE (SIZE(1..4)) OF SRS-CC-SetIndex
                                                                                                                        OPTIONAL
                                                                                                                                  -- Need M
```

-- TAG-SRS-CARRIERSWITCHING-STOP

SRS-CC-SetIndex field descriptions

cc-IndexInOneCC-Set

Indicates the CC index in one CC set for Type A (see TS 38.212 [17], TS 38.213 [13], clause 7.3.1, 11.4). The network always includes this field when the *srs-TPC-PDCCH-Group* is set to *typeA*.

cc-SetIndex

-- ASN1STOP

Indicates the CC set index for Type A associated (see TS 38.212 [17], TS 38.213 [13], clause 7.3.1, 11.4). The network always includes this field when the *srs-TPC-PDCCH-Group* is set to *typeA*. The network does not configure this field to 3 in this release of specification.

SRS-CarrierSwitching field descriptions

monitoringCells

A set of serving cells for monitoring PDCCH conveying SRS DCI format with CRC scrambled by TPC-SRS-RNTI (see TS 38.212 [17], TS 38.213 [13], clause 7.3.1, 11.3).

srs-SwitchFromServCellIndex

Indicates the serving cell whose UL transmission may be interrupted during SRS transmission on a PUSCH-less SCell. During SRS transmission on a PUSCH-less SCell, the UE may temporarily suspend the UL transmission on a serving cell with PUSCH in the same CG to allow the PUSCH-less SCell to transmit SRS. (see TS 38.214 [19], clause 6.2.1.3).

srs-TPC-PDCCH-Group

Network configures the UE with either typeA-SRS-TPC-PDCCH-Group or typeB-SRS-TPC-PDCCH-Group, if any.

typeA

Type A trigger configuration for SRS transmission on a PUSCH-less SCell (see TS 38.213 [13], clause 11.4). In this release, the network configures at most one entry (the first entry) of *typeA*, and the first entry corresponds to the serving cell in which the *SRS-CarrierSwitching* field is configured. SRS carrier switching to SUL carrier is not supported in this version of the specification.

typeB

Type B trigger configuration for SRS transmission on a PUSCH-less SCell (see TS 38.213 [13], clause 11.4).

SRS-TPC-PDCCH-Config field descriptions

srs-CC-SetIndexlist

A list of pairs of [cc-SetIndex; cc-IndexInOneCC-Set] (see TS 38.212 [17], TS 38.213 [13], clause 7.3.1, 11.4). The network does not configure this field for typeB.

SRS-Config

The IE *SRS-Config* is used to configure sounding reference signal transmissions. The configuration defines a list of SRS-Resources, a list of SRS-PosResources, a list of SRS-PosResources, a list of SRS-PosResources and a list of SRS-ResourceSets. Each resource set defines a set of SRS-Resources or SRS-PosResources. The network triggers the transmission of the set of SRS-Resources or SRS-PosResources using a configured aperiodicSRS-ResourceTrigger (L1 DCI). The network does not configure SRS specific power control parameters, *alpha*, *p0* or *pathlossReferenceRS* if *unifiedTCI-StateType* is configured for the serving cell.

SRS-Config information element

```
-- ASN1START
-- TAG-SRS-CONFIG-START
SRS-Config ::=
    srs-ResourceSetToReleaseList
                                            SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSetId
                                                                                                                     OPTIONAL, -- Need N
    srs-ResourceSetToAddModList
                                            SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSet
                                                                                                                     OPTIONAL, -- Need N
                                            SEOUENCE (SIZE(1..maxNrofSRS-Resources)) OF SRS-ResourceId
                                                                                                                     OPTIONAL, -- Need N
    srs-ResourceToReleaseList
    srs-ResourceToAddModList
                                            SEQUENCE (SIZE(1..maxNrofSRS-Resources)) OF SRS-Resource
                                                                                                                     OPTIONAL, -- Need N
    tpc-Accumulation
                                            ENUMERATED {disabled}
                                                                                                                     OPTIONAL. -- Need S
    srs-RequestDCI-1-2-r16
                                            INTEGER (1..2)
                                                                                                                     OPTIONAL, -- Need S
                                                                                                                     OPTIONAL, -- Need S
    srs-RequestDCI-0-2-r16
                                            INTEGER (1..2)
                                                                                                                     OPTIONAL, -- Need N
    srs-ResourceSetToAddModListDCI-0-2-r16 SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSet
    srs-ResourceSetToReleaseListDCI-0-2-r16 SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSetId
                                                                                                                     OPTIONAL, -- Need N
    srs-PosResourceSetToReleaseList-r16
                                            SEQUENCE (SIZE(1..maxNrofSRS-PosResourceSets-r16)) OF SRS-PosResourceSetId-r16
                                                                                                                     OPTIONAL, -- Need N
    srs-PosResourceSetToAddModList-r16
                                            SEOUENCE (SIZE(1..maxNrofSRS-PosResourceSets-r16)) OF SRS-PosResourceSet-r16
                                                                                                                                 OPTIONAL . -- Need N
    srs-PosResourceToReleaseList-r16
                                            SEOUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResourceId-r16
                                                                                                                                 OPTIONAL, -- Need N
    srs-PosResourceToAddModList-r16
                                            SEOUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResource-r16
                                                                                                                                 OPTIONAL -- Need N
    11
SRS-ResourceSet ::=
                                        SEOUENCE {
    srs-ResourceSet.Id
    srs-ResourceIdList
                                            SEQUENCE (SIZE(1..maxNrofSRS-ResourcesPerSet)) OF SRS-ResourceId
                                                                                                                 OPTIONAL, -- Cond Setup
    resourceType
                                            CHOICE {
        aperiodic
                                                SEQUENCE {
            aperiodicSRS-ResourceTrigger
                                                    INTEGER (1..maxNrofSRS-TriggerStates-1),
           csi-RS
                                                    NZP-CSI-RS-ResourceId
                                                                                                            OPTIONAL, -- Cond NonCodebook
            slotOffset
                                                    INTEGER (1..32)
                                                                                                            OPTIONAL, -- Need S
            . . . ,
           1 1
            aperiodicSRS-ResourceTriggerList
                                                        SEQUENCE (SIZE(1..maxNrofSRS-TriggerStates-2))
                                                            OF INTEGER (1..maxNrofSRS-TriggerStates-1)
                                                                                                            OPTIONAL -- Need M
           ]]
        semi-persistent
                                                SEOUENCE {
            associatedCSI-RS
                                                    NZP-CSI-RS-ResourceId
                                                                                                            OPTIONAL, -- Cond NonCodebook
       periodic
                                                SEOUENCE {
            associatedCSI-RS
                                                    NZP-CSI-RS-ResourceId
                                                                                                            OPTIONAL, -- Cond NonCodebook
                                            ENUMERATED {beamManagement, codebook, nonCodebook, antennaSwitching},
    usage
                                                                                                            OPTIONAL, -- Need S
    alpha
                                            Alpha
                                            INTEGER (-202..24)
                                                                                                            OPTIONAL, -- Cond Setup
    pathlossReferenceRS
                                            PathlossReferenceRS-Config
                                                                                                            OPTIONAL, -- Need M
    srs-PowerControlAdjustmentStates
                                            ENUMERATED { sameAsFci2, separateClosedLoop}
                                                                                                            OPTIONAL, -- Need S
```

```
pathlossReferenceRSList-r16
                                            SetupRelease { PathlossReferenceRSList-r16}
                                                                                                            OPTIONAL -- Need M
    11.
    ] ]
    usagePDC-r17
                                            ENUMERATED {true}
                                                                                                            OPTIONAL, -- Need R
    availableSlotOffsetList-r17
                                            SEQUENCE (SIZE(1..4)) OF AvailableSlotOffset-r17
                                                                                                            OPTIONAL, -- Need R
    followUnifiedTCI-StateSRS-r17
                                            ENUMERATED {enabled}
                                                                                                            OPTIONAL -- Need R
    11
AvailableSlotOffset-r17 ::= INTEGER (0..7)
PathlossReferenceRS-Config ::=
                                            CHOICE {
    ssb-Index
                                                SSB-Index,
    csi-RS-Index
                                                NZP-CSI-RS-ResourceId
PathlossReferenceRSList-r16 ::=
                                            SEQUENCE (SIZE (1..maxNrofSRS-PathlossReferenceRS-r16)) OF PathlossReferenceRS-r16
PathlossReferenceRS-r16 ::=
                                            SEQUENCE {
    srs-PathlossReferenceRS-Id-r16
                                                SRS-PathlossReferenceRS-Id-r16,
    pathlossReferenceRS-r16
                                                PathlossReferenceRS-Config
SRS-PathlossReferenceRS-Id-r16 ::=
                                            INTEGER (0..maxNrofSRS-PathlossReferenceRS-1-r16)
SRS-PosResourceSet-r16 ::=
                                            SEOUENCE {
    srs-PosResourceSetId-r16
                                                SRS-PosResourceSetId-r16,
    srs-PosResourceIdList-r16
                                                SEQUENCE (SIZE(1..maxNrofSRS-ResourcesPerSet)) OF SRS-PosResourceId-r16
                                                                                                            OPTIONAL, -- Cond Setup
    resourceType-r16
                                                CHOICE {
        aperiodic-r16
                                                    SEQUENCE {
            aperiodicSRS-ResourceTriggerList-r16
                                                        SEQUENCE (SIZE(1..maxNrofSRS-TriggerStates-1))
                                                            OF INTEGER (1..maxNrofSRS-TriggerStates-1)
                                                                                                            OPTIONAL, -- Need M
                                                    SEQUENCE {
        semi-persistent-r16
        periodic-r16
                                                    SEOUENCE {
    alpha-r16
                                                Alpha
                                                                                                            OPTIONAL, -- Need S
    p0-r16
                                                INTEGER (-202..24)
                                                                                                            OPTIONAL, -- Cond Setup
    pathlossReferenceRS-Pos-r16
                                                CHOICE {
        ssb-IndexServing-r16
                                                    SSB-Index,
       ssb-Ncell-r16
                                                    SSB-InfoNcell-r16,
        dl-PRS-r16
                                                    DL-PRS-Info-r16
                                                                                                            OPTIONAL, -- Need M
SRS-ResourceSetId ::=
                                        INTEGER (0..maxNrofSRS-ResourceSets-1)
```

]]

```
SRS-PosResourceSet.Id-r16 ::=
                                        INTEGER (0..maxNrofSRS-PosResourceSets-1-r16)
SRS-Resource ::=
                                        SEOUENCE {
    srs-ResourceId
                                            SRS-ResourceId.
   nrofSRS-Ports
                                            ENUMERATED {port1, ports2, ports4},
    ptrs-PortIndex
                                            ENUMERATED {n0, n1 }
                                                                                                            OPTIONAL. -- Need R
                                            CHOICE {
    transmissionComb
       n2
                                                SEQUENCE {
            combOffset-n2
                                                    INTEGER (0..1),
            cyclicShift-n2
                                                    INTEGER (0..7)
       },
       n4
                                                SEQUENCE {
            combOffset-n4
                                                    INTEGER (0..3),
            cyclicShift-n4
                                                    INTEGER (0..11)
    resourceMapping
                                            SEOUENCE {
       startPosition
                                                INTEGER (0..5),
                                                ENUMERATED {n1, n2, n4},
       nrofSymbols
       repetitionFactor
                                                ENUMERATED {n1, n2, n4}
    freqDomainPosition
                                            INTEGER (0..67),
    freqDomainShift
                                            INTEGER (0..268),
    freqHopping
                                            SEQUENCE {
       c-SRS
                                                INTEGER (0..63),
       b-SRS
                                                INTEGER (0..3),
       b-hop
                                                INTEGER (0..3)
    groupOrSequenceHopping
                                            ENUMERATED { neither, groupHopping, sequenceHopping },
    resourceType
                                            CHOICE {
        aperiodic
                                                SEQUENCE {
            . . .
                                                SEOUENCE {
       semi-persistent
           periodicityAndOffset-sp
                                                        SRS-PeriodicityAndOffset,
       periodic
                                                SEOUENCE {
           periodicityAndOffset-p
                                                         SRS-PeriodicityAndOffset,
    sequenceId
                                            INTEGER (0..1023),
    spatialRelationInfo
                                            SRS-SpatialRelationInfo
                                                                                                            OPTIONAL, -- Need R
    11
    resourceMapping-r16
                                            SEQUENCE {
       startPosition-r16
                                                INTEGER (0..13),
       nrofSymbols-r16
                                                ENUMERATED {n1, n2, n4},
       repetitionFactor-r16
                                                ENUMERATED {n1, n2, n4}
                                                                                                            OPTIONAL
                                                                                                                        -- Need R
    ]],
```

```
spatialRelationInfo-PDC-r17
                                            SetupRelease { SpatialRelationInfo-PDC-r17 }
                                                                                                            OPTIONAL, -- Need M
    resourceMapping-r17
                                            SEOUENCE {
        startPosition-r17
                                                INTEGER (0..13).
       nrofSymbols-r17
                                                ENUMERATED {n1, n2, n4, n8, n10, n12, n14},
                                                ENUMERATED {n1, n2, n4, n5, n6, n7, n8, n10, n12, n14}
        repetitionFactor-r17
                                                                                                            OPTIONAL, -- Need R
   partialFreqSounding-r17
                                            SEQUENCE {
        startRBIndexFScaling-r17
                                                CHOICE {
            startRBIndexAndFreqScalingFactor2-r17 INTEGER (0..1),
            startRBIndexAndFreqScalingFactor4-r17 INTEGER (0..3)
                                                ENUMERATED {enable}
        enableStartRBHopping-r17
                                                                                                            OPTIONAL
                                                                                                                        -- Need R
                                                                                                            OPTIONAL,
                                                                                                                        -- Need R
    transmissionComb-n8-r17
                                            SEQUENCE {
        combOffset-n8-r17
                                                INTEGER (0..7),
        cyclicShift-n8-r17
                                                INTEGER (0..5)
                                                                                                            OPTIONAL,
                                                                                                                        -- Need R
    srs-TCI-State-r17
                                            CHOICE {
                                                TCI-UL-State-Id-r17,
        srs-UL-TCI-State
        srs-DLorJointTCI-State
                                                TCI-StateId
                                                                                                            OPTIONAL
                                                                                                                        -- Need R
    ]],
    ] ]
    repetitionFactor-v1730
                                            ENUMERATED {n3}
                                                                                                            OPTIONAL,
                                                                                                                        -- Need R
    srs-DLorJointTCI-State-v1730
                                            SEQUENCE {
        cellAndBWP-r17
                                                ServingCellAndBWP-Id-r17
                                                                                                       OPTIONAL -- Cond DLorJointTCI-SRS
    ]]
SRS-PosResource-r16::=
                                        SEQUENCE {
    srs-PosResourceId-r16
                                            SRS-PosResourceId-r16,
    transmissionComb-r16
                                            CHOICE {
                                                SEQUENCE {
       n2-r16
            combOffset-n2-r16
                                                    INTEGER (0..1),
            cyclicShift-n2-r16
                                                    INTEGER (0..7)
       n4-r16
                                                SEOUENCE {
            combOffset-n4-r16
                                                     INTEGER (0..3),
            cyclicShift-n4-r16
                                                    INTEGER (0..11)
       n8-r16
                                                SEQUENCE {
            combOffset-n8-r16
                                                    INTEGER (0..7),
            cyclicShift-n8-r16
                                                    INTEGER (0..5)
        },
    resourceMapping-r16
                                              SEQUENCE {
        startPosition-r16
                                                    INTEGER (0..13),
        nrofSymbols-r16
                                                    ENUMERATED {n1, n2, n4, n8, n12}
    freqDomainShift-r16
                                              INTEGER (0..268),
    freqHopping-r16
                                              SEQUENCE {
        c-SRS-r16
                                                  INTEGER (0..63),
```

```
ENUMERATED { neither, groupHopping, sequenceHopping },
    groupOrSequenceHopping-r16
    resourceType-r16
                                             CHOICE {
        aperiodic-r16
                                                 SEQUENCE {
           slotOffset-r16
                                                     INTEGER (1..32)
                                                                                                          OPTIONAL, -- Need S
       semi-persistent-r16
                                                 SEQUENCE {
           periodicityAndOffset-sp-r16
                                                     SRS-PeriodicityAndOffset-r16,
           periodicityAndOffset-sp-Ext-r16
                                                     SRS-PeriodicityAndOffsetExt-r16
                                                                                                          OPTIONAL
                                                                                                                    -- Need R
           11
       periodic-r16
                                                 SEOUENCE {
           periodicityAndOffset-p-r16
                                                     SRS-PeriodicityAndOffset-r16,
           periodicityAndOffset-p-Ext-r16
                                                     SRS-PeriodicityAndOffsetExt-r16
                                                                                                          OPTIONAL
                                                                                                                    -- Need R
           11
    sequenceId-r16
                                             INTEGER (0..65535),
    spatialRelationInfoPos-r16
                                             SRS-SpatialRelationInfoPos-r16
                                                                                                          OPTIONAL, -- Need R
SRS-SpatialRelationInfo ::=
                               SEQUENCE {
    servingCellId
                                       ServCellIndex
                                                                                                          OPTIONAL, -- Need S
    referenceSignal
                                       CHOICE {
       ssb-Index
                                           SSB-Index,
       csi-RS-Index
                                           NZP-CSI-RS-ResourceId,
                                           SEQUENCE {
                                               SRS-ResourceId,
           resourceId
           uplinkBWP
                                               BWP-Id
SRS-SpatialRelationInfoPos-r16 ::=
                                       CHOICE {
    servingRS-r16
                                           SEQUENCE {
       servingCellId
                                               ServCellIndex
                                                                                                          OPTIONAL, -- Need S
       referenceSignal-r16
                                               CHOICE {
           ssb-IndexServing-r16
                                                   SSB-Index,
           csi-RS-IndexServing-r16
                                                   NZP-CSI-RS-ResourceId,
           srs-SpatialRelation-r16
                                                   SEQUENCE {
               resourceSelection-r16
                                                       CHOICE {
                   srs-ResourceId-r16
                                                           SRS-ResourceId,
                   srs-PosResourceId-r16
                                                           SRS-PosResourceId-r16
               uplinkBWP-r16
                                                       BWP-Id
```

```
ssb-Ncell-r16
                                            SSB-InfoNcell-r16,
    dl-PRS-r16
                                            DL-PRS-Info-r16
SSB-Configuration-r16 ::=
                                    SEOUENCE {
    ssb-Freq-r16
                                     ARFCN-ValueNR,
    halfFrameIndex-r16
                                        ENUMERATED {zero, one},
    ssbSubcarrierSpacing-r16
                                        SubcarrierSpacing,
    ssb-Periodicity-r16
                                        ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2,spare1 }
                                                                                                            OPTIONAL, -- Need S
    sfn0-Offset-r16
                                        SEQUENCE {
        sfn-Offset-r16
                                            INTEGER (0..1023),
        integerSubframeOffset-r16
                                            INTEGER (0..9)
                                                                                                             OPTIONAL -- Need R
                                                                                                             OPTIONAL, -- Need R
    sfn-SSB-Offset-r16
                                        INTEGER (0..15),
    ss-PBCH-BlockPower-r16
                                        INTEGER (-60..50)
                                                                                                             OPTIONAL -- Cond Pathloss
SSB-InfoNcell-r16 ::=
                                    SEOUENCE {
    physicalCellId-r16
                                        PhysCellId,
    ssb-IndexNcell-r16
                                        SSB-Index
                                                                                                             OPTIONAL, -- Need S
                                                                                                             OPTIONAL -- Need S
    ssb-Configuration-r16
                                        SSB-Configuration-r16
DL-PRS-Info-r16 ::=
                                    SEOUENCE {
    dl-PRS-ID-r16
                                       INTEGER (0..255),
    dl-PRS-ResourceSetId-r16
                                       INTEGER (0..7),
    dl-PRS-ResourceId-r16
                                       INTEGER (0..63)
                                                                                                             OPTIONAL -- Need S
SRS-ResourceId ::=
                                        INTEGER (0..maxNrofSRS-Resources-1)
SRS-PosResourceId-r16 ::=
                                        INTEGER (0..maxNrofSRS-PosResources-1-r16)
SRS-PeriodicityAndOffset ::=
                                        CHOICE {
    sl1
                                            NULL.
    s12
                                            INTEGER(0..1),
    s14
                                            INTEGER(0..3),
    s15
                                            INTEGER(0..4),
    sl8
                                            INTEGER(0..7),
    s110
                                            INTEGER(0..9),
    s116
                                            INTEGER(0..15),
    s120
                                            INTEGER(0..19),
    s132
                                            INTEGER(0..31),
    s140
                                            INTEGER(0..39),
    s164
                                            INTEGER(0..63),
    s180
                                            INTEGER(0..79),
    s1160
                                            INTEGER(0..159),
    s1320
                                            INTEGER(0..319),
    s1640
                                            INTEGER(0..639),
    s11280
                                            INTEGER(0..1279),
    s12560
                                            INTEGER(0..2559)
SRS-PeriodicityAndOffset-r16 ::=
                                        CHOICE {
```

```
sl1
                                             NULL,
    s12
                                             INTEGER(0..1),
                                             INTEGER(0..3),
    s14
    s15
                                             INTEGER(0..4),
    s18
                                             INTEGER(0..7),
    s110
                                             INTEGER(0..9),
    s116
                                             INTEGER(0..15),
    s120
                                             INTEGER(0..19),
    s132
                                             INTEGER(0..31),
    s140
                                             INTEGER(0..39),
    s164
                                             INTEGER(0..63),
    s180
                                             INTEGER(0..79),
    s1160
                                             INTEGER(0..159),
    s1320
                                             INTEGER(0..319),
    s1640
                                             INTEGER(0..639),
    s11280
                                             INTEGER(0..1279),
    s12560
                                             INTEGER(0..2559),
                                             INTEGER(0..5119),
    s15120
                                             INTEGER(0..10239),
    s110240
    s140960
                                             INTEGER(0..40959),
    s181920
                                             INTEGER(0..81919),
    . . .
SRS-PeriodicityAndOffsetExt-r16 ::=
                                         CHOICE {
                                             INTEGER(0..127),
    s1256
                                             INTEGER(0..255),
    s1512
                                             INTEGER(0..511),
    s120480
                                             INTEGER(0..20479)
SpatialRelationInfo-PDC-r17 ::=
                                  SEQUENCE {
    referenceSignal
                                       CHOICE {
        ssb-Index
                                           SSB-Index,
        csi-RS-Index
                                           NZP-CSI-RS-ResourceId,
        dl-PRS-PDC
                                           NR-DL-PRS-ResourceID-r17,
        srs
                                           SEQUENCE {
            resourceId
                                               SRS-ResourceId,
                                               BWP-Id
            uplinkBWP
        },
-- TAG-SRS-CONFIG-STOP
-- ASN1STOP
```

SRS-Config field descriptions

tpc-Accumulation

If the field is absent, UE applies TPC commands via accumulation. If disabled, UE applies the TPC command without accumulation (this applies to SRS when a separate closed loop is configured for SRS) (see TS 38.213 [13], clause 7.3).

SRS-Resource, SRS-PosResource field descriptions

cyclicShift-n2

Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1).

cyclicShift-n4

Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1).

enableStartRBHopping

When this RRC parameter is configured, start RB location hopping is enabled for partial frequency sounding in different SRS frequency hopping periods for periodic/semi-persistent/aperiodic SRS as described in Clause 6.4.1.4 in TS 38.211.

freqHopping

Includes parameters capturing SRS frequency hopping (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, the network always configures this field such that b-hop > b-SRS.

groupOrSequenceHopping

Parameter(s) for configuring group or sequence hopping (see TS 38.211 [16], clause 6.4.1.4.2). For CLI SRS-RSRP measurement, the network always configures this parameter to 'neither'.

nrofSRS-Ports

Number of ports. For CLI SRS-RSRP measurement, the network always configures this parameter to 'port1'.

periodicityAndOffset-p, periodicityAndOffset-p-Ext

Periodicity and slot offset for this SRS resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. For periodicity *sl1* the offset is 0 slots (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, *sl1280* and *sl2560* cannot be configured. For *SRS-PosResource*, values *sl20480*, *sl40960* and *sl81920* cannot be configured for SCS=15kHz, values *sl40960* and *sl81920* cannot be configured for SCS=30kHz, and value *sl81920* cannot be configured for SCS=60kHz.

When periodicityAndOffset-p-Ext is present, periodicityAndOffset-p shall be ignored by the UE.

periodicityAndOffset-sp, periodicityAndOffset-sp-Ext

Periodicity and slot offset for this SRS resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. For periodicity *sl1* the offset is 0 slots (see TS 38.214 [19], clause 6.2.1). For *SRS-PosResource*, values *sl20480*, *sl40960* and *sl81920* cannot be configured for SCS=30kHz, and value *sl81920* cannot be configured for SCS=60kHz.

When periodicityAndOffset-sp-Ext is present, periodicityAndOffset-sp shall be ignored by the UE.

ptrs-PortIndex

The PTRS port index for this SRS resource for non-codebook based UL MIMO. This is only applicable when the corresponding *PTRS-UplinkConfig* is set to CP-OFDM. The *ptrs-PortIndex* configured here must be smaller than the *maxNrofPorts* configured in the *PTRS-UplinkConfig* (see TS 38.214 [19], clause 6.2.3.1). This parameter is not applicable to CLI SRS-RSRP measurement.

resourceMapping

OFDM symbol location of the SRS resource within a slot including *nrofSymbols* (number of OFDM symbols), *startPosition* (value 0 refers to the last symbol, value 1 refers to the second last symbol, and so on) and *repetitionFactor* (see TS 38.214 [19], clause 6.2.1 and TS 38.211 [16], clause 6.4.1.4). The configured SRS resource does not exceed the slot boundary. If *resourceMapping-r16* is signalled, UE shall ignore the *resourceMapping* (without suffix). If *resourceMapping-r17* is signalled, *resourceMapping-r16* is not signalled and the UE shall ignore the *resourceMapping* (without suffix) and only the values of nrofSymbols which are integer multiples of the configured repetitionFactor can be configured. The network can only signal *repetitionFactor-v1730* if *resourceMapping-r17* is signalled. When *repetitionFactor-v1730* is signalled, the UE shall ignore *repetitionFactor-v1730* is signalled, the UE shall ignore

resourceType

Periodicity and offset for semi-persistent and periodic SRS resource (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, only 'periodic' is applicable for resourceType.

sequenceld

Sequence ID used to initialize pseudo random group and sequence hopping (see TS 38.214 [19], clause 6.2.1).

servingCellId

The serving Cell ID of the source SSB, CSI-RS, or SRS for the spatial relation of the target SRS resource. If this field is absent the SSB, the CSI-RS, or the SRS is from the same serving cell where the SRS is configured.

spatialRelationInfo

Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS (see TS 38.214 [19], clause 6.2.1). This parameter is not applicable to CLI SRS-RSRP measurement. This field is not configured if *unifiedTCI-StateType* is configured for the serving cell.

spatialRelationInfo-PDC

Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS/DL-PRS-PDC (see TS 38.214 [19], clause 6.2.1). The field is present in case of *resourceType=periodic* and *usagePDC-r17=true* in the *SRS-ResourceSet*, otherwise the field is absent.

spatialRelationInfoPos

Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS/DL-PRS (see TS 38.214 [19], clause 6.2.1). If the IE *srs-Resourceld-Ext* is present, the IE *srs-Resourceld* in *spatialRelationInfoPos* represents the index from 0 to 63. Otherwise the IE *srs-Resourceld* in *spatialRelationInfoPos* represents the index from 0 to 31.

srs-RequestDCI-0-2

Indicate the number of bits for "SRS request" in DCI format 0_2. When the field is absent, then the value of 0 bit for "SRS request" in DCI format 0_2 is applied. If the parameter srs-RequestDCI-0-2 is configured to value 1, 1 bit is used to indicate one of the first two rows of Table 7.3.1.1.2-24 in TS 38.212 [17] for triggered aperiodic SRS resource set. If the value 2 is configured, 2 bits are used to indicate one of the rows of Table 7.3.1.1.2-24 in TS 38.212 [17]. When UE is configured with supplementaryUplink, an extra bit (the first bit of the SRS request field) is used for the non-SUL/SUL indication.

srs-RequestDCI-1-2

Indicate the number of bits for "SRS request" in DCI format 1_2. When the field is absent, then the value of 0 bit for "SRS request" in DCI format 1_2 is applied. When the UE is configured with *supplementaryUplink*, an extra bit (the first bit of the SRS request field) is used for the non-SUL/SUL indication (see TS 38.214 [19], clause 6.1.1.2).

srs-ResourceSetToAddModListDCI-0-2

List of SRS resource set to be added or modified for DCI format 0_2 (see TS 38.212 [17], clause 7.3.1).

srs-ResourceSetToReleaseListDCI-0-2

List of SRS resource set to be released for DCI format 0_2 (see TS 38.212 [17], clause 7.3.1).

srs-TCI-State

Configuration of either a UL TCI state or a joint TCI state for the SRS resource. In case of *UL TCI-State*, refers to the TCI state defined in *ul-TCI-StateList* in the *BWP-UplinkDedicated* where the *SRS-Config* is configured. In case of DL or joint TCI state, refers to a TCI state defined in *dl-OrJointTCI-StateToAddModList* in *pdsch-Config* of the *BWP-DownlinkDedicated* and serving cell indicated by *cellAndBWP*. This field is absent when the SRS resource is in an *SRS-ResourceSet* configured with *followUnifiedTCI-StateSRS-r17* or when the field *unifiedTCI-StateType* is not configured to the serving cell which the SRS resource is located in.

startRBIndexAndFreqScalingFactor

Configures the UE with the startRBIndex and freqScalingFactor for partial frequency sounding as described in Clause 6.4.1.4 in TS 38.211. The startRBIndexForFScaling2 gives the startRBIndex when freqScalingFactor is 2 and the startRBIndexForFScaling4 gives the startRBIndex when FreqScalingFactor is 4

transmissionComb. transmissionComb-n8

Comb value (2 or 4 or 8) and comb offset (0..combValue-1) (see TS 38.214 [19], clause 6.2.1).

SRS-ResourceSet, SRS-PosResourceSet field descriptions

alpha

alpha value for SRS power control (see TS 38.213 [13], clause 7.3). When the field is absent the UE applies the value 1.

aperiodicSRS-ResourceTriggerList

An additional list of DCI "code points" upon which the UE shall transmit SRS according to this SRS resource set configuration (see TS 38.214 [19], clause 6). When the field is not included during a reconfiguration of SRS-ResourceSet of resourceType set to aperiodic, UE maintains this value based on the Need M; that is, this list is not considered as an extension of aperiodicSRS-ResourceTrigger for purpose of applying the general rule for extended list in clause 6.1.3.

aperiodicSRS-ResourceTrigger

The DCI "code point" upon which the UE shall transmit SRS according to this SRS resource set configuration (see TS 38.214 [19], clause 6).

associatedCSI-RS

ID of CSI-RS resource associated with this SRS resource set in non-codebook based operation (see TS 38.214 [19], clause 6.1.1.2).

availableSlotOffset

Indicates the number of available slots from slot n+k to the slot where the aperiodic SRS resource set is transmitted, where slot n is the slot with the triggering DCI, and k is the legacy triggering offset (slotOffset, not based on availabel slot) as described in clause 6.2.1 of TS 38.214.

csi-RS

ID of CSI-RS resource associated with this SRS resource set. (see TS 38.214 [19], clause 6.1.1.2).

csi-RS-IndexServingcell

Indicates CSI-RS index belonging to a serving cell

followUnifiedTCI-StateSRS

When set to enabled, for SRS resource Set, the UE applies the "indicated" UL only TCI or joint TCI as specified in TS 38.214 [19], clause 5.1.5. This parameter may be configured for aperiodic SRS for BM or SRS of any time-domain behavior for codebook, non-codebook, and antenna switching.

p0

P0 value for SRS power control. The value is in dBm. Only even values (step size 2) are allowed (see TS 38.213 [13], clause 7.3).

pathlossReferenceRS

A reference signal (e.g. a CSI-RS config or a SS block) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3).

pathlossReferenceRS-Pos

A reference signal (e.g. a SS block or a DL-PRS config) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3).

pathlossReferenceRSList

Multiple candidate pathloss reference RS(s) for SRS power control, where one candidate RS can be mapped to SRS Resource Set via MAC CE (clause 6.1.3.27 in TS 38.321 [3]). The network can only configure this field if *pathlossReferenceRS* is not configured in the same *SRS-ResourceSet*.

resourceSelection

Indicates whether the configured SRS spatial relation resource is a SRS-Resource or SRS-PosResource.

resourceType

Time domain behavior of SRS resource configuration, see TS 38.214 [19], clause 6.2.1. The network configures SRS resources in the same resource set with the same time domain behavior on periodic, aperiodic and semi-persistent SRS. The aperiodic SRS is not applicable for the UE in RRC_INACTIVE.

slotOffset

An offset in number of slots between the triggering DCI and the actual transmission of this SRS-ResourceSet. If the field is absent the UE applies no offset (value 0).

srs-PowerControlAdjustmentStates

Indicates whether hsrs,c(i) = fc(i,1) or hsrs,c(i) = fc(i,2) (if twoPUSCH-PC-AdjustmentStates are configured) or separate close loop is configured for SRS. This parameter is applicable only for UIs on which UE also transmits PUSCH. If absent or release, the UE applies the value sameAs-Fci1 (see TS 38.213 [13], clause 7.3).

srs-ResourceldList, srs-PosResourceldList

The IDs of the SRS-Resource/SRS-PosResource used in this SRS-ResourceSet/SRS-PosResourceSet. If this SRS-ResourceSet is configured with usage set to codebook, the srs-ResourceIdList contains at most 2 entries. If this SRS-ResourceSet is configured with usage set to nonCodebook, the srs-ResourceIdList contains at most 4 entries.

srs-ResourceSetId, srs-PosResourceSetId

The ID of this resource set. It is unique in the context of the BWP in which the parent SRS-Config is defined.

ssb-IndexSevingcell

Indicates SSB index belonging to a serving cell

ssb-NCell

This field indicates a SSB configuration from neighboring cell

usage

Indicates if the SRS resource set is used for beam management, codebook based or non-codebook based transmission or antenna switching. See TS 38.214 [19], clause 6.2.1. Reconfiguration between codebook based and non-codebook based transmission is not supported.

usagePDC

If configured, it indicates that this SRS resource set is used for propagation delay compensation. The field can be present in only one SRS-Resource Set.

SSB-InfoNCell field descriptions

physicalCellId

This field specifies the physical cell ID of the neighbour cell for which SSB configuration is provided.

ssb-IndexNcell

This field specifies the index of the SSB for a neighbour cell. See TS 38.213 [13]. If this field is absent, the UE determines the ssb-IndexNcell of the physicalCellId based on its SSB measurement from the cell.

ssb-Configuration

This field specifies the full configuration of the SSB. If this field is absent, the UE obtains the configuration for the SSB from *nr-SSB-Config* received as part of DL-PRS assistance data in LPP, see TS 37.355 [49], by looking up the corresponding SSB configuration using the field *physicalCellId*.

DL-PRS-Info field descriptions

dI-PRS-ID

This field specifies the UE specific TRP ID (see TS 37.355 [49]) for which PRS configuration is provided.

dl-PRS-ResourceSetId

This field specifies the PRS-ResourceSet ID of a PRS resourceSet.

dl-PRS-Resourceld

This field specifies the PRS-Resource ID of a PRS resource. If this field is absent, the UE determines the *dl-PRS-ResourceID* based on its PRS measurement from the TRP (see TS 37.355 [49]) and DL-PRS Resource Set.

SSB-Configuration field descriptions

halfFrameIndex

Indicates whether SSB is in the first half or the second half of the frame. Value zero indicates the first half and value 1 indicates the second half.

integerSubframeOffset

Indicates the subframe boundary offset of the cell in which SSB is transmited.

sfn0-Offset

Indiactes the time offset of the SFN0 slot 0 for the cell with respect to SFN0 slot 0 of serving cell.

sfn-Offset

Specifies the SFN offset between the cell in which SSB is transmited and serving cell. The offset corresponds to the number of full radio frames counted from the beginning of a radio frame #0 of serving cell to the beginning of the closest subsequent radio frame #0 of the cell in which SSB is transmitted.

sfn-SSB-Offset

Indicates the SFN offset of the transmitted SSB relative to the start of the SSB period. Value 0 indicates that the SSB is transmitted in the first system frame, value 1 indicates that SSB is transmitted in the second system frame and so on. The network configures this field according to the field ssb-Periodicity such that the indicated system frame does not exceed the configured SSB periodicity.

ssb-Freq

Indicates the frequency of the SSB.

ss-PBCH-BlockPower

Average EPRE of the resources elements that carry secondary synchronization signals in dBm that the NW used for SSB transmission, see TS 38.213 [13], clause 7.

ssb-Periodicity

Indicates the periodicity of the SSB. If the field is absent, the UE applies the value ms5. (see TS 38.213 [13], clause 4.1)

ssbSubcarrierSpacing

Subcarrier spacing of SSB.

Only the following values are applicable depending on the used frequency:

FR1: 15 or 30 kHz FR2-1: 120 or 240 kHz FR2-2: 120, 480, or 960 kHz

Conditional Presence	Explanation
Setup	This field is mandatory present upon configuration of SRS-ResourceSet or SRS-Resource and optionally present, Need M,
	otherwise.
NonCodebook	This field is optionally present, Need M, in case of non-codebook based transmission, otherwise the field is absent.
Pathloss	The field is mandatory present if the IE SSB-InfoNcell is included in pathlossReferenceRS-Pos; otherwise it is optionally
	present, Need R
DLorJointTCI-SRS	The field is mandatory present if srs-DLorJointTCI-State is configured, otherwise it is absent Need R.

SRS-RSRP-Range

The IE *SRS-RSRP-Range* specifies the value range used in SRS-RSRP measurements and thresholds. The integer value for SRS-RSRP measurements is according to Table 10.1.22.1.2-1 in TS 38.133 [14]. For thresholds, the actual value is (IE value –140) dBm, except for the IE value 98, in which case the actual value is infinity.

SRS-RSRP-Range information element

```
-- ASN1START
-- TAG-SRS-RSRP-RANGE-START

SRS-RSRP-Range-r16 ::= INTEGER(0..98)

-- TAG-SRS-RSRP-RANGE-STOP
-- ASN1STOP
```

SRS-TPC-CommandConfig

The IE SRS-TPC-CommandConfig is used to configure the UE for extracting TPC commands for SRS from a group-TPC messages on DCI

SRS-TPC-CommandConfig information element

```
-- ASN1START
-- TAG-SRS-TPC-COMMANDCONFIG-START
SRS-TPC-CommandConfig ::=
                                    SEOUENCE {
                                  INTEGER (1..31)
   startingBitOfFormat2-3
                                                                                                      OPTIONAL. -- Need R
   fieldTypeFormat2-3
                                        INTEGER (0..1)
                                                                                                       OPTIONAL. -- Need R
   ] ]
   startingBitOfFormat2-3SUL
                                        INTEGER (1..31)
                                                                                                       OPTIONAL -- Need R
   11
-- TAG-SRS-TPC-COMMANDCONFIG-STOP
```

SRS-TPC-CommandConfig field descriptions

fieldTypeFormat2-3

-- ASN1STOP

The type of a field within the group DCI with SRS request fields (optional), which indicates how many bits in the field are for SRS request (0 or 2). Note that for Type A, there is a common SRS request field for all SCells in the set, but each SCell has its own TPC command bits. See TS 38.212 [17] clause 7.3.1 and , TS 38.213 [13], clause 11.3.

startingBitOfFormat2-3

The starting bit position of a block within the group DCI with SRS request fields (optional) and TPC commands. The value 1 of the field corresponds to the first/left most bit of format2-3. The value 2 of the field corresponds to the second bit format2-3, and so on (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 11.3).

startingBitOfFormat2-3SUL

The starting bit position of a block within the group DCI with SRS request fields (optional) and TPC commands for SUL carrier (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 11.3).

- SSB-Index

The IE SSB-Index identifies an SS-Block within an SS-Burst. See TS 38.213 [13], clause 4.1.

SSB-Index information element

```
-- ASN1START
-- TAG-SSB-INDEX-START

SSB-Index ::= INTEGER (0..maxNrofSSBs-1)

-- TAG-SSB-INDEX-STOP
-- ASN1STOP
```

- SSB-MTC

The IE SSB-MTC is used to configure measurement timing configurations, i.e., timing occasions at which the UE measures SSBs.

SSB-MTC information element

```
-- ASN1START
-- TAG-SSB-MTC-START
SSB-MTC ::=
                                        SEQUENCE {
    periodicityAndOffset
                                            CHOICE {
        sf5
                                            INTEGER (0..4),
        sf10
                                                INTEGER (0..9),
        sf20
                                                INTEGER (0..19),
        sf40
                                                INTEGER (0..39),
        sf80
                                                INTEGER (0..79),
        sf160
                                                INTEGER (0..159)
    duration
                                            ENUMERATED { sf1, sf2, sf3, sf4, sf5 }
SSB-MTC2 ::=
                                    SEQUENCE {
    pci-List
                                        SEQUENCE (SIZE (1..maxNrofPCIsPerSMTC)) OF PhysCellId
                                                                                                                OPTIONAL, -- Need M
    periodicity
                                        ENUMERATED {sf5, sf10, sf20, sf40, sf80, spare3, spare2, spare1}
SSB-MTC2-LP-r16 ::=
                                    SEQUENCE {
    pci-List
                                        SEQUENCE (SIZE (1..maxNrofPCIsPerSMTC)) OF PhysCellId
                                                                                                                OPTIONAL, -- Need R
    periodicity
                                        ENUMERATED {sf10, sf20, sf40, sf80, sf160, spare3, spare2, spare1}
SSB-MTC3-r16 ::=
                                    SEQUENCE {
    periodicityAndOffset-r16
                                        CHOICE {
       sf5-r16
                                                    INTEGER (0..4),
       sf10-r16
                                                    INTEGER (0..9),
       sf20-r16
                                                    INTEGER (0..19),
       sf40-r16
                                                    INTEGER (0..39),
        sf80-r16
                                                    INTEGER (0..79),
        sf160-r16
                                                    INTEGER (0..159),
        sf320-r16
                                                    INTEGER (0..319),
        sf640-r16
                                                    INTEGER (0..639),
        sf1280-r16
                                                    INTEGER (0..1279)
    },
    duration-r16
                                        ENUMERATED {sf1, sf2, sf3, sf4, sf5},
                                        SEQUENCE (SIZE (1..maxNrofPCIsPerSMTC)) OF PhysCellId
    pci-List-r16
                                                                                                                OPTIONAL, -- Need M
                                        SetupRelease { SSB-ToMeasure }
                                                                                                                OPTIONAL -- Need M
    ssb-ToMeasure-r16
SSB-MTC4-r17 ::=
                             SEQUENCE {
    pci-List-r17
                                 SEQUENCE (SIZE (1..maxNrofPCIsPerSMTC)) OF PhysCellId
                                                                                                                OPTIONAL, -- Need M
```

```
offset-r17
                                INTEGER (0..159)
SSB-MTC-AdditionalPCI-r17 ::=
                                   SEOUENCE {
    additionalPCIIndex-r17
                                        Additional PCI Index-r17.
    additionalPCI-r17
                                        PhysCellId,
   periodicity-r17
                                       ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2, spare1 },
    ssb-PositionsInBurst-r17
                                       CHOICE {
        shortBitmap
                                           BIT STRING (SIZE (4)),
       mediumBitmap
                                           BIT STRING (SIZE (8)),
       longBitmap
                                           BIT STRING (SIZE (64))
    ss-PBCH-BlockPower-r17
                                        INTEGER (-60..50)
AdditionalPCIIndex-r17 ::= INTEGER(1..maxNrofAdditionalPCI-r17)
-- TAG-SSB-MTC-STOP
-- ASN1STOP
```

SSB-MTC field descriptions

duration

Duration of the measurement window in which to receive SS/PBCH blocks. It is given in number of subframes (see TS 38.213 [13], clause 4.1).

periodicityAndOffset

Periodicity and offset of the measurement window in which to receive SS/PBCH blocks, see 5.5.2.10. Periodicity and offset are given in number of subframes.

SSB-MTC2 field descriptions

pci-List

PCIs that follow this SMTC.

SSB-MTC3 field descriptions

duration

Duration of the measurement window in which to receive SS/PBCH blocks. It is given in number of subframes (see TS 38.213 [13], clause 4.1).

pci-List

PCIs that follow this SMTC, used for IAB-node discovery.

periodicityAndOffset

Periodicity and offset of the measurement window in which to receive SS/PBCH blocks, see 5.5.2.10. Periodicity and offset are given in number of subframes.

ssb-ToMeasure

The set of SS blocks to be measured within the SMTC measurement duration. The first/leftmost bit corresponds to SS block index 0, the second bit corresponds to SS block index 1, and so on. Value 0 in the bitmap indicates that the corresponding SS block is not to be measured while value 1 indicates that the corresponding SS block is to be measured (see TS 38.215 [9]). When the field is not configured the IAB-MT measures on all SS blocks. Regardless of the value of this field, SS blocks outside of the applicable *smtc* are not to be measured. See TS 38.215 [9] clause 5.1.1.

SSB-MTC4 field descriptions

pci-List

PCIs that follow this SMTC.

offset

Offset of the measurement window in which to receive SS/PBCH blocks, see 5.5.2.10. Offset is given in number of subframes.

SSB-MTC-AdditionalPCI field descriptions

additionalPCI

PCI of the additional SSB different from serving cell PCI.

periodicity

Periodicity of the SS/PBCH blocks, see 5.5.2.10. Periodicity is given in number of subframes.

ssb-PositionsInBurst

Indicates the time domain positions of the transmitted SS-blocks in a half frame with SS/PBCH blocks as defined in TS 38.213 [13], clause 4.1. The first/leftmost bit corresponds to SS/PBCH block index 0, the second bit corresponds to SS/PBCH block index 1, and so on. Value 0 in the bitmap indicates that the corresponding SS/PBCH block is not transmitted while value 1 indicates that the corresponding SS/PBCH block is transmitted.

ss-PBCH-BlockPower

Average EPRE of the resources elements that carry secondary synchronization signals in dBm that the NW used for SSB transmission, see TS 38.213 [13], clause 7.

SSB-PositionQCL-Relation

The IE SSB-PositionQCL-Relation is used to indicate the QCL relationship between SSB positions on the frequency indicated by ssbFrequency (see TS 38.213 [13], clause 4.1) for operation with shared spectrum channel access. Value n1 corresponds to 1, value n2 corresponds to 2 and so on.

SSB-PositionQCL-Relation information element

```
-- ASN1START
-- TAG-SSB-POSITIONQCL-RELATION-START

SSB-PositionQCL-Relation-r16 ::= ENUMERATED {n1,n2,n4,n8}

SSB-PositionQCL-Relation-r17 ::= ENUMERATED {n32, n64}

-- TAG-SSB-POSITIONQCL-RELATION-STOP
-- ASN1STOP
```

- SSB-ToMeasure

The IE SSB-ToMeasure is used to configure a pattern of SSBs. For operation with shared spectrum channel access in FR1, only mediumBitmap is used, and for FR2-2, longBitmap is used.

SSB-ToMeasure information element

```
-- TAG-SSB-TOMEASURE-START

SSB-TOMeasure ::= CHOICE {
    shortBitmap BIT STRING (SIZE (4)),
    neediumBitmap BIT STRING (SIZE (8)),
    longBitmap BIT STRING (SIZE (64))
}

-- TAG-SSB-TOMEASURE-STOP
-- ASN1STOP
```

SSB-ToMeasure field descriptions

longBitmap

Bitmap when maximum number of SS/PBCH blocks per half frame equals to 64 as defined in TS 38.213 [13], clause 4.1. For operation with shared spectrum channel access in FR2-2, if the k-th bit is set to 1, the UE assumes that one or more SS/PBCH blocks within the SMTC measurement duration with candidate SS/PBCH block indexes corresponding to SS/PBCH block index equal to (k-1) may be transmitted; if the k-th bit is set to 0, the UE assumes that the corresponding SS/PBCH block(s) are not transmitted.

mediumBitmap

Bitmap when maximum number of SS/PBCH blocks per half frame equals to 8 as defined in TS 38.213 [13], clause 4.1. For operation with shared spectrum channel access, if the k-th bit is set to 1, the UE assumes that one or more SS/PBCH blocks within the SMTC measurement duration with candidate SS/PBCH block indexes corresponding to SS/PBCH block index equal to k – 1 may be transmitted; if the kt-th bit is set to 0, the UE assumes that the corresponding SS/PBCH block(s) are not transmitted. The k-th bit is set to 0, where k > ssb-PositionQCL-Common and the number of actually transmitted SS/PBCH blocks is not larger than the number of 1's in the bitmap. If ssb-PositionQCL is configured with a value smaller than ssb-PositionQCL-Common, only the leftmost K bits (K = ssb-PositionQCL) are applicable for the corresponding cell.

shortBitmap

Bitmap when maximum number of SS/PBCH blocks per half frame equals to 4 as defined in TS 38.213 [13], clause 4.1.

SS-RSSI-Measurement

The IE SS-RSSI-Measurement is used to configure RSSI measurements based on synchronization reference signals.

SS-RSSI-Measurement information element

```
-- ASN1START
-- TAG-SS-RSSI-MEASUREMENT-START

SS-RSSI-Measurement ::= SEQUENCE {
    measurementSlots BIT STRING (SIZE (1..80)),
    endSymbol INTEGER(0..3)
}

-- TAG-SS-RSSI-MEASUREMENT-STOP
-- ASN1STOP
```

SS-RSSI-Measurement field descriptions

endSymbol

Within a slot that is configured for RSSI measurements (see *measurementSlots*) the UE measures the RSSI from symbol 0 to symbol *endSymbol*. This field identifies the entry in Table 5.1.3-1 in TS 38.215 [9], which determines the actual end symbol.

measurementSlots

Indicates the slots in which the UE can perform RSSI measurements. The length of the BIT STRING is equal to the number of slots in the configured SMTC window (determined by the duration and by the subcarrierSpacing). The first (left-most / most significant) bit in the bitmap corresponds to the first slot in the SMTC window, the second bit in the bitmap corresponds to the second slot in the SMTC window, and so on. The UE measures in slots for which the corresponding bit in the bitmap is set to 1. In case this field is configured for a SCell with *ca-SlotOffset-r16*, the bits in the bitmap corresponds to the slots that are fully contained in the SMTC window.

SubcarrierSpacing

The IE SubcarrierSpacing determines the subcarrier spacing. Restrictions applicable for certain frequencies, channels or signals are clarified in the fields that use this IE.

SubcarrierSpacing information element

```
-- ASN1START
-- TAG-SUBCARRIERSPACING-START

SubcarrierSpacing ::= ENUMERATED {kHz15, kHz30, kHz60, kHz120, kHz240, kHz480-v1700, kHz960-v1700, spare1}

-- TAG-SUBCARRIERSPACING-STOP
-- ASN1STOP
```

TAG-Config

The IE *TAG-Config* is used to configure parameters for a time-alignment group.

TAG-Config information element

```
-- ASN1START
-- TAG-TAG-CONFIG-START
TAG-Config ::=
                                   SEOUENCE {
    tag-ToReleaseList
                                        SEQUENCE (SIZE (1..maxNrofTAGs)) OF TAG-Id
                                                                                                            OPTIONAL, -- Need N
                                        SEOUENCE (SIZE (1..maxNrofTAGs)) OF TAG
    tag-ToAddModList
                                                                                                            OPTIONAL
                                                                                                                      -- Need N
                                    SEOUENCE {
TAG ::=
    taq-Id
                                        TAG-Id,
    timeAlignmentTimer
                                        TimeAlignmentTimer,
TAG-Id ::=
                                    INTEGER (0..maxNrofTAGs-1)
```

-- TAG-TAG-CONFIG-STOP -- ASN1STOP

TAG field descriptions

tag-Id

Indicates the TAG of the SpCell or an SCell, see TS 38.321 [3]. Uniquely identifies the TAG within the scope of a Cell Group (i.e. MCG or SCG).

timeAlignmentTimer

The timeAlignmentTimer for TAG with ID tag-Id, as specified in TS 38.321 [3].

TAR-Config

The IE *TAR-Config* is used to configure Timing Advance reporting in non-terrestrial networks.

TAR-Config information element

TAR-Config field descriptions

offsetThresholdTA

Offset for TA reporting as specified in TS 38.321 [3]. Network only configures this parameter for MCG.

timingAdvanceSR

Used to configure whether a Timing Advance report may trigger a Scheduling Request as specified in TS 38.321 [3].

TCI-ActivatedConfig

The IE TCI-ActivatedConfig is used to provide activated TCI states for PDSCH and/or PDCCH of the PSCell or of an SCell.

TCI-ActivatedConfig information element

```
-- ASN1START
```

⁻⁻ TAG-TCI-ACTIVATEDCONFIG-START

TCI-ActivatedConfig field descriptions

pdcch-TCI

Indicates the TCI state for PDCCH for each configured CORESET of the DL BWP to be activated at SCell activation, to be activated for the PSCell at SCG activation and/or to be used for BFD, RLM and measurements while the SCG is deactivated. The list includes exactly as many entries as CORESETs configured in this BWP, ordered by increasing values of *ControlResourceSet-Id*, i.e. the first entry indicates the TCI state for the configured CORESET with the lowest *ControlResourceset-Id* value, the second value indicates the TCI states for the configured CORESET with the second lowest *ControlResourceset-Id* value, and so on.

pdsch-TCI

Indicates TCI states for PDSCH reception at SCell addition/activation or of the PSCell at SCG activation. This field indicates activated TCI state(s) for this BWP ordered by increasing values of *TCI-StateId*, i.e. the first bit indicates the activation state of the TCI state with the lowest *TCI-StateId* value, the second value indicates the activation status of the TCI state with the second lowest *TCI-State-Id* value, and so on. A bit set to 0 indicates that the corresponding TCI state is deactivated, a bit set to 1 indicates that the TCI state is activated.

- TCI-State

The IE TCI-State associates one or two DL reference signals with a corresponding quasi-colocation (QCL) type.

TCI-State information element

```
-- ASN1START
-- TAG-TCI-STATE-START
TCI-State ::=
                                    SEOUENCE {
    tci-StateId
                                        TCI-StateId,
   qcl-Typel
                                        OCL-Info,
   qcl-Type2
                                        OCL-Info
                                                                                                     OPTIONAL,
                                                                                                               -- Need R
    . . . ,
    additionalPCI-r17
                                        Additional PCT Index-r17
                                                                                                     OPTIONAL, -- Need R
   pathlossReferenceRS-Id-r17
                                        PathlossReferenceRS-Id-r17
                                                                                                    OPTIONAL, -- Cond JointTCI1
   ul-powerControl-r17
                                        Uplink-powerControlId-r17
                                                                                                    OPTIONAL -- Cond JointTCI
    11
OCL-Info ::=
                                    SEOUENCE {
    cell
                                        ServCellIndex
                                                                                                     OPTIONAL, -- Need R
   bwp-Id
                                        BWP-Id
                                                                                                     OPTIONAL, -- Cond CSI-RS-Indicated
    referenceSignal
                                        CHOICE {
                                            NZP-CSI-RS-ResourceId,
        csi-rs
```

```
ssb SSB-Index
},
qcl-Type ENUMERATED {typeA, typeB, typeC, typeD},
...
}
-- TAG-TCI-STATE-STOP
-- ASNISTOP
```

QCL-Info field descriptions

bwp-ld

The DL BWP which the RS is located in.

cell

The UE's serving cell in which the *referenceSignal* is configured. If the field is absent, it applies to the serving cell in which the *TCI-State* is applied by the UE. The RS can be located on a serving cell other than the serving cell for which the *TCI-State* is applied by the UE only if the *qcI-Type* is configured as *typeC* or *typeD*. See TS 38.214 [19] clause 5.1.5.

referenceSignal

Reference signal with which quasi-collocation information is provided as specified in TS 38.214 [19] clause 5.1.5.

qcl-Type

QCL type as specified in TS 38.214 [19] clause 5.1.5.

TCI-State field descriptions

additionalPCI

Indicates the physical cell IDs (PCI) of the SSBs when referenceSignal is configured as SSB for both QCL-Type1 and QCL-Type2. In case the cell is present, the additionalPCI refers to a PCI value configured in the list configured using additionalPCI-ToAddModList in the serving cell indicated by the field cell. Otherwise, it refers to a PCI value configured in a list additionalPCI-ToAddModList configured in the serving cell where the TCI-State is applied by the UE. When this field is present the cell for qcI-Type1 and qcI-Type2 is configured with same value, if present.

pathlossReferenceRS-Id

The ID of the reference signal (e.g. a CSI-RS or an SS block) used for PUSCH, PUCCH and SRS path loss estimation.

qcl-Type1, qcl-Type2

QCL information for the TCl state as specified in TS 38.214 [19] clause 5.1.5.

tci-StateId

ID number of the TCI state.

ul-PowerControl

Configures power control parameters for PUCCH, PUSCH and SRS for this TCI state. The field is present here only if *ul-powerControl* is not configured in any *BWP-Uplink-Dedicated* of this serving cell.

Conditional Presence	Explanation
CSI-RS-Indicated	This field is mandatory present if csi-rs is included, absent otherwise
JointTCI	This field is optionally present, Need R, if this serving cell is configured with <i>unifiedTCI-StateType</i> set to ' <i>joint</i> '. It is absent, Need R, otherwise.
JointTCI1	This field is mandatory present, if this serving cell is configured with unifiedTCI-StateType set to 'joint'. It is absent, Need R, otherwise.

- TCI-StateId

The IE TCI-StateId is used to identify one TCI-State configuration.

TCI-StateId information element

```
-- ASN1START
-- TAG-TCI-STATEID-START

TCI-StateId ::= INTEGER (0..maxNrofTCI-States-1)
-- TAG-TCI-STATEID-STOP
-- ASN1STOP
```

TCI-UL-State

The IE TCI-UL-State indicates the TCI state information for UL transmission.

TCI-UL-State information element

```
-- ASN1START
-- TAG-TCI-UL-STATE-START
TCI-UL-State-r17 ::=
                                SEOUENCE {
                                    TCI-UL-State-Id-r17,
    tci-UL-State-Id-r17
    servingCellId-r17
                                    ServCellIndex
                                                                                         OPTIONAL,
                                                                                                    -- Need R
    bwp-Id-r17
                                    BWP-Id
                                                                                         OPTIONAL, -- Cond CSI-RSorSRS-Indicated
    referenceSignal-r17
                                    CHOICE {
       ssb-Index-r17
                                        SSB-Index,
       csi-RS-Index-r17
                                        NZP-CSI-RS-ResourceId,
       srs-r17
                                        SRS-ResourceId
    additionalPCI-r17
                                    AdditionalPCIIndex-r17
                                                                                         OPTIONAL, -- Need R
                                    Uplink-powerControlId-r17
    ul-powerControl-r17
                                                                                         OPTIONAL, -- Need R
    pathlossReferenceRS-Id-r17
                                    PathlossReferenceRS-Id-r17
                                                                                         OPTIONAL, -- Cond Mandatory
-- TAG-TCI-UL-STATE-STOP
-- ASN1STOP
```

TCI-UL-State field descriptions

additionalPCI

Indicates the physical cell IDs (PCI) of the SSBs when *referenceSignal* is configured as SSB. In case the *servingCellId* is present, the *additionalPCI* refers to a PCI value configured in the list configured using *additionalPCI-ToAddModList* in the serving cell indicated by the field *servingCellId*. Otherwise, it refers to a PCI value configured in the list configured using *additionalPCI-ToAddModList* in the serving cell where the *ul-TCI-StateList* is applied by the UE.

bwp-ld

The DL BWP which the CSI-RS is located in or UL BWP where the SRS is located in.

servingCellId

The UE's serving cell in which the referenceSignal is configured. If the field is absent, it applies to the serving cell in which the TCI-UL-State is applied by the UE.

pathlossReferenceRS-Id

The ID of the reference Signal (e.g. a CSI-RS or a SS block) used for PUSCH, PUCCH and SRS path loss estimation.

ul-powerControl

Configures power control parameters for PUCCH, PUSCH and SRS for this TCI state. The field is present here only if *ul-powerControl* is not configured in any *BWP-Uplink-Dedicated* of this serving cell.

Conditional Presence	Explanation
CSI-RSorSRS-Indicated	This field is mandatory present if referenceSignal is set to csi-RS-index or to srs, absent otherwise
Mandatory	The field is mandatory present.

TCI-UL-StateId

The IE TCI-UL-StateId is used to identify one TCI-UL-State configuration.

TCI-UL-StateId information element

```
-- ASN1START
-- TAG-TCI-UL-STATEID-START

TCI-UL-State-Id-r17 ::= INTEGER (0..maxUL-TCI-1-r17)

-- TAG-TCI-UL-STATEID-STOP
-- ASN1STOP
```

TDD-UL-DL-ConfigCommon

The IE TDD-UL-DL-ConfigCommon determines the cell specific Uplink/Downlink TDD configuration.

TDD-UL-DL-ConfigCommon information element

```
-- ASN1START
-- TAG-TDD-UL-DL-CONFIGCOMMON-START

TDD-UL-DL-ConfigCommon ::= SEQUENCE {
```

```
referenceSubcarrierSpacing
                                       SubcarrierSpacing,
   pattern1
                                       TDD-UL-DL-Pattern,
   pattern2
                                       TDD-UL-DL-Pattern
                                                                                                               OPTIONAL, -- Need R
TDD-UL-DL-Pattern ::=
                                   SEOUENCE {
                                       ENUMERATED {ms0p5, ms0p625, ms1, ms1p25, ms2, ms2p5, ms5, ms10},
    dl-UL-TransmissionPeriodicity
   nrofDownlinkSlots
                                       INTEGER (0..maxNrofSlots),
   nrofDownlinkSymbols
                                       INTEGER (0..maxNrofSymbols-1),
   nrofUplinkSlots
                                       INTEGER (0..maxNrofSlots),
                                       INTEGER (0..maxNrofSymbols-1),
   nrofUplinkSymbols
    . . . ,
    ] ]
    dl-UL-TransmissionPeriodicity-v1530
                                           ENUMERATED {ms3, ms4}
                                                                                                               OPTIONAL -- Need R
    ]]
-- TAG-TDD-UL-DL-CONFIGCOMMON-STOP
-- ASN1STOP
```

TDD-UL-DL-ConfigCommon field descriptions

referenceSubcarrierSpacing

Reference SCS used to determine the time domain boundaries in the UL-DL pattern which must be common across all subcarrier specific carriers, i.e., independent of the actual subcarrier spacing using for data transmission.

Only the following values are applicable depending on the used frequency:

FR1: 15, 30, or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

The network configures a not larger than any SCS of configured BWPs for the serving cell. The network or *SL-PreconfigGeneral* configures a not larger than the SCS of (pre-)configured SL BWP.See TS 38.213 [13], clause 11.1.

TDD-UL-DL-Pattern field descriptions

dl-UL-TransmissionPeriodicity

Periodicity of the DL-UL pattern, see TS 38.213 [13], clause 11.1. If the *dl-UL-TransmissionPeriodicity-v1530* is signalled, UE shall ignore the *dl-UL-TransmissionPeriodicity* (without suffix).

nrofDownlinkSlots

Number of consecutive full DL slots at the beginning of each DL-UL pattern, see TS 38.213 [13], clause 11.1. In this release, the maximum value for this field is 80.

nrofDownlinkSymbols

Number of consecutive DL symbols in the beginning of the slot following the last full DL slot (as derived from *nrofDownlinkSlots*). The value 0 indicates that there is no partial-downlink slot. (see TS 38.213 [13], clause 11.1).

nrofUplinkSlots

Number of consecutive full UL slots at the end of each DL-UL pattern, see TS 38.213 [13], clause 11.1. In this release, the maximum value for this field is 80.

nrofUplinkSymbols

Number of consecutive UL symbols in the end of the slot preceding the first full UL slot (as derived from *nrofUplinkSlots*). The value 0 indicates that there is no partial-uplink slot. (see TS 38.213 [13], clause 11.1).

TDD-UL-DL-ConfigDedicated

The IE TDD-UL-DL-ConfigDedicated determines the UE-specific Uplink/Downlink TDD configuration.

TDD-UL-DL-ConfigDedicated information element

```
-- ASN1START
-- TAG-TDD-UL-DL-CONFIGDEDICATED-START
TDD-UL-DL-ConfigDedicated ::=
                                    SEQUENCE {
    slotSpecificConfigurationsToAddModList
                                                SEQUENCE (SIZE (1..maxNrofSlots)) OF TDD-UL-DL-SlotConfig
                                                                                                                OPTIONAL, -- Need N
    slotSpecificConfigurationsToReleaseList
                                                SEQUENCE (SIZE (1..maxNrofSlots)) OF TDD-UL-DL-SlotIndex
                                                                                                                OPTIONAL, -- Need N
TDD-UL-DL-ConfigDedicated-IAB-MT-r16::=
                                                SEQUENCE {
    slotSpecificConfigurationsToAddModList-IAB-MT-r16 SEQUENCE (SIZE (1..maxNrofSlots)) OF TDD-UL-DL-SlotConfig-IAB-MT-r16
                                                                                                                                 OPTIONAL, -- Need
N
    slotSpecificConfigurationsToReleaseList-IAB-MT-r16 SEQUENCE (SIZE (1..maxNrofSlots)) OF TDD-UL-DL-SlotIndex
                                                                                                                                 OPTIONAL, -- Need
N
    . . .
TDD-UL-DL-SlotConfig ::=
                                    SEQUENCE {
    slotIndex
                                        TDD-UL-DL-SlotIndex,
    symbols
                                        CHOICE {
       allDownlink
                                            NULL.
       allUplink
                                            NULL,
        explicit
                                            SEOUENCE {
           nrofDownlinkSymbols
                                                INTEGER (1..maxNrofSymbols-1)
                                                                                                                OPTIONAL, -- Need S
           nrofUplinkSymbols
                                                INTEGER (1..maxNrofSymbols-1)
                                                                                                                OPTIONAL -- Need S
```

OPTIONAL, -- Need S

OPTIONAL -- Need S

OPTIONAL, -- Need S

OPTIONAL -- Need S

```
TDD-UL-DL-SlotConfig-IAB-MT-r16::= SEQUENCE {
    slot.Index-r16
                                          TDD-UL-DL-SlotIndex.
   symbols-IAB-MT-r16
                                          CHOICE {
       allDownlink-r16
                                              NULL.
       allUplink-r16
                                              NULL,
       explicit-r16
                                              SEOUENCE {
           nrofDownlinkSymbols-r16
                                                  INTEGER (1..maxNrofSymbols-1)
           nrofUplinkSymbols-r16
                                                  INTEGER (1..maxNrofSymbols-1)
       explicit-IAB-MT-r16
                                             SEQUENCE {
           nrofDownlinkSymbols-r16
                                                 INTEGER (1..maxNrofSymbols-1)
           nrofUplinkSymbols-r16
                                                  INTEGER (1..maxNrofSymbols-1)
TDD-UL-DL-SlotIndex ::=
                                  INTEGER (0..maxNrofSlots-1)
-- TAG-TDD-UL-DL-CONFIGDEDICATED-STOP
-- ASN1STOP
```

TDD-UL-DL-ConfigDedicated field descriptions

slotSpecificConfigurationsToAddModList

The slotSpecificConfigurationToAddModList allows overriding UL/DL allocations provided in tdd-UL-DL-configurationCommon, see TS 38.213 [13], clause 11.1.

TDD-UL-DL-ConfigDedicated-IAB-MT field descriptions

slotSpecificConfigurationsToAddModList-IAB-MT

The slotSpecificConfigurationToAddModList-IAB-MT allows overriding UL/DL allocations provided in tdd-UL-DL-configurationCommon with a limitation that effectively only flexible symbols can be overwritten in Rel-16.

slotSpecificConfigurationsToReleaseList-IAB-MT

The slotSpecificConfigurationsToReleaseList-IAB-MT allows release of a set of slot configuration previously add with slotSpecificConfigurationToAddModList-IAB-MT.

TDD-UL-DL-SlotConfig field descriptions

nrofDownlinkSymbols

Number of consecutive DL symbols in the beginning of the slot identified by *slotIndex*. If the field is absent the UE assumes that there are no leading DL symbols. (see TS 38.213 [13], clause 11.1).

nrofUplinkSymbols

Number of consecutive UL symbols in the end of the slot identified by *slotIndex*. If the field is absent the UE assumes that there are no trailing UL symbols. (see TS 38.213 [13], clause 11.1).

slotIndex

Identifies a slot within a slot configuration period given in tdd-UL-DL-configurationCommon, see TS 38.213 [13], clause 11.1.

symbols

The direction (downlink or uplink) for the symbols in this slot. Value *allDownlink* indicates that all symbols in this slot are used for downlink; value *allUplink* indicates that all symbols in this slot are used for uplink; value *explicit* indicates explicitly how many symbols in the beginning and end of this slot are allocated to downlink and uplink, respectively.

TDD-UL-DL-SlotConfig-IAB-MT field descriptions

symbols-IAB-MT

The symbols-IAB-MT is used to configure an IAB-MT with the SlotConfig applicable for one serving cell. Value allDownlink indicates that all symbols in this slot are used for downlink; value allUplink indicates that all symbols in this slot are used for uplink; value explicit indicates explicitly how many symbols in the beginning and end of this slot are allocated to downlink and uplink, respectively; value explicit-IAB-MT indicates explicitly how many symbols in the beginning and end of this slot are allocated to uplink and downlink, respectively.

TrackingAreaCode

The IE TrackingAreaCode is used to identify a tracking area within the scope of a PLMN/SNPN, see TS 24.501 [23].

TrackingAreaCode information element

```
-- ASN1START
```

-- TAG-TRACKINGAREACODE-START

TrackingAreaCode ::= BIT STRING (SIZE (24))

- -- TAG-TRACKINGAREACODE-STOP
- -- ASN1STOP

T-Reselection

The IE *T-Reselection* concerns the cell reselection timer Treselection_{RAT} for NR and E-UTRA. Value in seconds. For value 0, behaviour as specified in 7.1.2 applies.

T-Reselection information element

- -- ASN1START
- -- TAG-TRESELECTION-START

```
T-Reselection ::= INTEGER (0..7)

-- TAG-TRESELECTION-STOP

-- ASN1STOP
```

TimeAlignmentTimer

The IE *TimeAlignmentTimer* is used to configure the time alignment timer as specified in TS 38.321 [3]. The values are in ms.

TimeAlignmentTimer information element

```
-- ASN1START
-- TAG-TIMEALIGNMENTTIMER-START

TimeAlignmentTimer ::= ENUMERATED {ms500, ms750, ms1280, ms1920, ms2560, ms5120, ms10240, infinity}

-- TAG-TIMEALIGNMENTTIMER-STOP
-- ASN1STOP
```

- TimeToTrigger

The IE *TimeToTrigger* specifies the value range used for time to trigger parameter, which concerns the time during which specific criteria for the event needs to be met in order to trigger a measurement report. Value *ms0* corresponds to 0 ms and behaviour as specified in 7.1.2 applies, value *ms40* corresponds to 40 ms, and so on.

TimeToTrigger information element

UAC-BarringInfoSetIndex

The IE *UAC-BarringInfoSetIndex* provides the index of the entry in *uac-BarringInfoSetList*. Value 1 corresponds to the first entry in *uac-BarringInfoSetList*, value 2 corresponds to the second entry in this list and so on. An index value referring to an entry not included in *uac-BarringInfoSetList* indicates no barring.

UAC-BarringInfoSetIndex information element

-- ASN1START

```
-- TAG-UAC-BARRINGINFOSETINDEX-START

UAC-BarringInfoSetIndex ::= INTEGER (1..maxBarringInfoSet)

-- TAG-UAC-BARRINGINFOSETINDEX-STOP

-- ASN1STOP
```

UAC-BarringInfoSetList

The IE *UAC-BarringInfoSetList* provides a list of access control parameter sets. An access category can be configured with access parameters according to one of the sets.

UAC-BarringInfoSetList information element

```
-- ASN1START
-- TAG-UAC-BARRINGINFOSETLIST-START
UAC-BarringInfoSetList ::=
                                   SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet
UAC-BarringInfoSetList-v1700 ::= SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet-v1700
UAC-BarringInfoSet ::=
                                   SEOUENCE {
    uac-BarringFactor
                                       ENUMERATED {p00, p05, p10, p15, p20, p25, p30, p40,
                                                   p50, p60, p70, p75, p80, p85, p90, p95},
                                       ENUMERATED {s4, s8, s16, s32, s64, s128, s256, s512},
    uac-BarringTime
    uac-BarringForAccessIdentity
                                       BIT STRING (SIZE(7))
UAC-BarringInfoSet-v1700 ::= SEQUENCE {
    uac-BarringFactorForAI3-r17 ENUMERATED {p00, p05, p10, p15, p20, p25, p30, p40, p50, p60, p70, p75, p80, p85, p90, p95}
                                                                      OPTIONAL -- Need S
-- TAG-UAC-BARRINGINFOSETLIST-STOP
-- ASN1STOP
```

UAC-BarringInfoSetList field descriptions

uac-BarringInfoSetList

List of access control parameter sets. Each access category can be configured with access parameters corresponding to a particular set by *uac-barringInfoSetIndex*. Association of an access category with an index that has no corresponding entry in the *uac-BarringInfoSetList* is valid configuration and indicates no barring.

uac-BarringForAccessIdentity

Indicates whether access attempt is allowed for each Access Identity. The leftmost bit, bit 0 in the bit string corresponds to Access Identity 1, bit 1 in the bit string corresponds to Access Identity 2, bit 2 in the bit string corresponds to Access Identity 11, bit 3 in the bit string corresponds to Access Identity 12, bit 4 in the bit string corresponds to Access Identity 13, bit 5 in the bit string corresponds to Access Identity 14, and bit 6 in the bit string corresponds to Access Identity 15. Value 0 means that access attempt is allowed for the corresponding access identity.

uac-BarringFactor

Represents the probability that access attempt would be allowed during access barring check.

uac-BarringFactorForAl3

Barring factor applicable for Access Identity 3. Represents the probability that access attempt would be allowed during access barring check. If absent, the UE considers the access attempt as allowed.

uac-BarringTime

The average time in seconds before a new access attempt is to be performed after an access attempt was barred at access barring check for the same access category, see 5.3.14.5.

UAC-BarringPerCatList

The IE *UAC-BarringPerCatList* provides access control parameters for a list of access categories.

UAC-BarringPerCatList information element

```
-- ASN1START
-- TAG-UAC-BARRINGPERCATLIST-START

UAC-BarringPerCatList ::= SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat

UAC-BarringPerCat ::= SEQUENCE {
    accessCategory INTEGER (1..maxAccessCat-1),
    uac-barringInfoSetIndex
}

-- TAG-UAC-BARRINGPERCATLIST-STOP
-- ASN1STOP
```

UAC-BarringPerCatList field descriptions

accessCategory

The Access Category according to TS 22.261 [25].

UAC-BarringPerPLMN-List

The IE UAC-BarringPerPLMN-List provides access category specific access control parameters, which are configured per PLMN/SNPN.

UAC-BarringPerPLMN-List information element

```
-- ASN1START
-- TAG-UAC-BARRINGPERPLMN-LIST-START
                                    SEQUENCE (SIZE (1.. maxPLMN)) OF UAC-BarringPerPLMN
UAC-BarringPerPLMN-List ::=
UAC-BarringPerPLMN ::=
                                    SEQUENCE {
   plmn-IdentityIndex
                                        INTEGER (1..maxPLMN),
    uac-ACBarringListType
                                        CHOICE {
       uac-ImplicitACBarringList
                                            SEQUENCE (SIZE(maxAccessCat-1)) OF UAC-BarringInfoSetIndex,
       uac-ExplicitACBarringList
                                            UAC-BarringPerCatList
                                                                                                           OPTIONAL
                                                                                                                        -- Need S
-- TAG-UAC-BARRINGPERPLMN-LIST-STOP
-- ASN1STOP
```

UAC-BarringPerPLMN-List field descriptions

uac-ACBarringListType

Access control parameters for each access category valid only for a specific PLMN or SNPN. UE behaviour upon absence of this field is specified in clause 5.3.14.2.

plmn-IdentityIndex

Index of the PLMN or SNPN across the plmn-IdentityInfoList and npn-IdentityInfoList fields included in SIB1.

UE-TimersAndConstants

The IE UE-Timers And Constants contains timers and constants used by the UE in RRC_CONNECTED, RRC_INACTIVE and RRC_IDLE.

UE-TimersAndConstants information element

```
-- ASN1START
-- TAG-UE-TIMERSANDCONSTANTS-START
UE-TimersAndConstants ::=
                                    SEQUENCE {
    t300
                                        ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000},
                                        ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000},
    t301
    t310
                                        ENUMERATED {ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
   n310
                                        ENUMERATED {n1, n2, n3, n4, n6, n8, n10, n20},
                                        ENUMERATED {ms1000, ms3000, ms5000, ms10000, ms15000, ms20000, ms30000},
    t311
   n311
                                        ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10},
    t319
                                        ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000},
    . . .
-- TAG-UE-TIMERSANDCONSTANTS-STOP
-- ASN1STOP
```

UF-TimersAndConstantsRemoteUF

The IE UE-TimersAndConstantsRemoteUE contains timers and constants used by the L2 U2N Remote UE in RRC CONNECTED, RRC INACTIVE and RRC IDLE.

UE-TimersAndConstantsRemoteUE information element

UE-TimersAndConstantsRemoteUE field descriptions

t300-RemoteUE

Indicates the timer value of T300 used by L2 U2N Remote UE. If the field is absent, the timer value indicated in t300 applies to L2 U2N Remote UE.

t301-RemoteUE

Indicates the timer value of T301 used by L2 U2N Remote UE. If the field is absent, the timer value indicated in t301 applies to L2 U2N Remote UE.

t319-RemoteUE

Indicates the timer value of T319 used by L2 U2N Remote UE. If the field is absent, the timer value indicated in t319 applies to L2 U2N Remote UE.

UL-DelayValueConfig

The IE *UL-DelayValueConfig* specifies the configuration of the UL PDCP Packet Delay value per DRB measurement specified in TS 38.314 [53].

UL-DelayValueConfig information element

```
-- ASN1START
-- TAG-ULDELAYVALUECONFIG-START

UL-DelayValueConfig-r16 ::= SEQUENCE {
    delay-DRBlist-r16 SEQUENCE (SIZE(1..maxDRB)) OF DRB-Identity
}

-- TAG-ULDELAYVALUECONFIG-STOP
-- ASN1STOP
```

UL-Delay Value Config field descriptions

delay-DRBlist

Indicates the DRB IDs used by UE to provide results of UL PDCP Packet Delay value per DRB measurement as specified in TS 38.314 [53].

UL-ExcessDelayConfig

The IE UL-ExcessDelayConfig IE specifies the configuration of the UL PDCP Excess Packet Delay per DRB measurement specified in TS 38.314 [53].

UL-ExcessDelayConfig information element

UL-ExcessDelayConfig field descriptions

drb-IdentityList

Indicates the DRB IDs used by UE to provide results of UL PDCP Excess Packet Delay per DRB measurement as specified in TS 38.314 [53].

delayThreshold

Indicates the delay threshold for the DRB IDs indicated in DRB-IdentityList. Value ms0dot25 corresponds to 0.25ms, ms0dot5 corresponds to 0.5ms, ms1 corresponds to 1ms and so on.

UL-GapFR2-Config

The IE *UL-GapFR2-Config* specifies the FR2 uplink gap configuration.

UL-GapFR2-Config information element

UL-GapFR2-Config field descriptions

gapOffset

-- ASN1STOP

Value gap Offset is the gap offset of the FR2 UL gap pattern with UGRP indicated in the field ugrp. The value range is from 0 to ugrp-1.

refFR2-ServCellAsyncCA

Indicates the FR2 serving cell identifier whose SFN and subframe is used for FR2 UL gap calculation for this gap pattern with asynchronous CA involving FR2 carrier(s).

ugl

Value *ugl* is the gap length in ms of the FR2 UL gap. The FR2 UL gap length is according to Table 9.1.11-1 in TS 38.133 [14]. Value *ms0dot125* corresponds to 0.25 ms and so on.

ugrp

Value ugrp is the gap repetition period in (ms) of the FR2 UL gap. The FR2 UL gap repetition period is according to Table 9.1.11-1 in TS 38.133 [14].

Conditional Presence	Explanation
AsyncCA	This field is mandatory present when configuring FR2 UL gap pattern to UE in:
	- (NG)EN-DC, NR SA, NE-DC or NR-DC without FR2-FR2 band combination, with asynchronous CA involving FR2 carriers.
	Otherwise, it is absent.

UplinkCancellation

The IE *UplinkCancellation* is used to configure the UE to monitor PDCCH for the CI-RNTI.

UplinkCancellation information element

```
-- ASN1START
-- TAG-UPLINKCANCELLATION-START
UplinkCancellation-r16 ::=
                                    SEOUENCE {
    ci-RNTI-r16
                                         RNTI-Value,
    dci-PayloadSizeForCI-r16
                                        INTEGER (0..maxCI-DCI-PayloadSize-r16),
    ci-ConfigurationPerServingCell-r16 SEQUENCE (SIZE (1..maxNrofServingCells)) OF CI-ConfigurationPerServingCell-r16,
    . . .
CI-ConfigurationPerServingCell-r16 ::= SEQUENCE {
    servingCellId
                                             ServCellIndex,
                                             INTEGER (0..maxCI-DCI-PayloadSize-1-r16),
    positionInDCI-r16
    positionInDCI-ForSUL-r16
                                            INTEGER (0..maxCI-DCI-PayloadSize-1-r16)
                                                                                                                  OPTIONAL, -- Cond SUL-Only
                                            ENUMERATED {n1, n2, n4, n5, n7, n8, n10, n14, n16, n20, n28, n32, n35, n42, n56, n112},
    ci-PayloadSize-r16
    timeFrequencyRegion-r16
                                             SEQUENCE {
```

```
timeDurationForCI-r16 ENUMERATED {n2, n4, n7, n14} OPTIONAL, -- Cond

SymbolPeriodicity

timeGranularityForCI-r16 ENUMERATED {n1, n2, n4, n7, n14, n28},

frequencyRegionForCI-r16 INTEGER (0..37949),

deltaOffset-r16 INTEGER (0..2),

...

},

uplinkCancellationPriority-v1610 ENUMERATED {enabled}

-- TAG-UPLINKCANCELLATION-STOP
```

UplinkCancellation field descriptions

ci-ConfigurationPerServingCell

Indicates (per serving cell) the position of the ci-PaylaodSize bit CI values inside the DCI payload (see TS 38.213 [13], clause 11.2A).

ci-RNTI

-- ASN1STOP

RNTI used for indication cancellation in UL (see TS 38.212 [17] clause 7.3.1 and TS 38.213 [13], clause 11.2A).

dci-PayloadSizeForCl

Total length of the DCI payload scrambled with CI-RNTI (see TS 38.213 [13], clause 11.2A).

CI-ConfigurationPerServingCell field descriptions

ci-PayloadSize

Configures the field size for each UL cancelation indicator of this serving cell (servingCellId) (see TS 38.213 [13], clause 11.2A).

deltaOffset

Configures the additional offset from the end of a PDCCH reception where the UE detects the DCI format 2_4 and the first symbol of the T_"CI" symbols, in the unit of OFDM symbols (see TS 38.213 [13], clause 11.2A).

frequencyRegionForCl

Configures the reference frequency region where a detected UL CI is applicable (see TS 38.213 [13], clause 11.2A). It is defined in the same way as locationAndBandwidth.

positionInDCI

Starting position (in number of bit) of the ci-PayloadSize bit CI value applicable for this serving cell (servingCellId) within the DCI payload (see TS 38.213 [13], clause 11.2A).

positionInDCI-ForSUL

Starting position (in number of bit) of the *ci-PayloadSize* bit CI value applicable for SUL of this serving cell (servingCellId) within the DCI payload (see TS 38.213 [13], clause 11.2A).

timeDurationForCl

Configures the duration of the reference time region in symbols where a detected UL CI is applicable of this serving cell (servingCellId) (see TS 38.213 [13], clause 11.2A). If the field is absent, i.e., the configured UL CI monitoring periodicity indicated by *monitoringSlotPeriodicityAndOffset* for DCI format 2_4 is larger than 1 slot or 1 slot with only one monitoring occasion, the UE applies the value of the configured UL CI monitoring periodicity.

timeFrequencyRegion

Configures the reference time and frequency region where a detected UL CI is applicable of this serving cell (servingCellId) (see TS 38.213 [13], clause 11.2A).

timeGranularityForCl

Configures the number of partitions within the time region of this serving cell (servingCellId) (see TS 38.213 [13], clause 11.2A).

uplinkCancellationPriority

Configures uplink cancellation behavior if both UL CI and intra-UE priority indicator are configured for a given UE. If the field is present, then UL CI is only applicable to the UL transmissions indicated/configured as low priority level. If the field is absent, UL CI is applicable to UL transmission irrespective of its priority level (see TS 38.213 [13], clause 11.2A).

Conditional Presence	Explanation
SUL-Only	The field is optionally present, Need R, if supplementaryUplink is configured in ServingCellConfig. It is absent otherwise.
SymbolPeriodicity	This field is mandatory present if the configured UL CI monitoring periodicity indicated by monitoringSlotPeriodicityAndOffset
	for DCI format 2_4 is 1 slot with more than one monitoring occasion, otherwise absent.

UplinkConfigCommon

The IE *UplinkConfigCommon* provides common uplink parameters of a cell.

UplinkConfigCommon information element

```
-- ASN1START
-- TAG-UPLINKCONFIGCOMMON-START

UplinkConfigCommon ::= SEQUENCE {
    frequencyInfoUL FrequencyInfoUL OPTIONAL, -- Cond InterFreqHOAndServCellAdd initialUplinkBWP BWP-UplinkCommon OPTIONAL, -- Cond ServCellAdd dummy TimeAlignmentTimer
```

UplinkConfigCommon field descriptions		
frequencyInfoUL		
Absolute uplink frequency configuration and subcarrier specific virtual carriers.		
initialUplinkBWP		
The initial uplink BWP configuration for a serving cell (see TS 38.213 [13], clause 12).		
initialUplinkBWP-RedCap		
If present, RedCap UEs use this UL BWP instead of initialUplinkBWP.		
If absent, RedCap UEs use initialUplinkBWP provided that it does not exceed the RedCap UE maximum bandwidth (see also clause 5.2.2.4.2).		

Conditional Presence	Explanation
InterFreqHOAndServCellAdd	This field is mandatory present for inter-frequency handover and upon serving cell (PSCell/SCell) addition. Otherwise, the field is optionally
	present, Need M.
ServCellAdd	This field is mandatory present upon serving cell addition (for PSCell and SCell) and upon handover from E-UTRA to NR. It is optionally
	present, Need M otherwise.

UplinkConfigCommonSIB

The IE *UplinkConfigCommonSIB* provides common uplink parameters of a cell.

UplinkConfigCommonSIB information element

```
-- ASN1START
-- TAG-UPLINKCONFIGCOMMONSIB-START
UplinkConfigCommonSIB ::=
                                        SEQUENCE {
    frequencyInfoUL
                                            FrequencyInfoUL-SIB,
    initialUplinkBWP
                                            BWP-UplinkCommon,
    timeAlignmentTimerCommon
                                            TimeAlignmentTimer
UplinkConfigCommonSIB-v1700 ::=
                                        SEQUENCE {
    initialUplinkBWP-RedCap-r17
                                            BWP-UplinkCommon
                                                                                            OPTIONAL -- Need R
-- TAG-UPLINKCONFIGCOMMONSIB-STOP
-- ASN1STOP
```

UplinkConfigCommonSIB field descriptions

frequencyInfoUL

Absolute uplink frequency configuration and subcarrier specific virtual carriers.

InitialUplinkBWP

The initial uplink BWP configuration for a PCell (see TS 38.213 [13], clause 12).

initialUplinkBWP-RedCap

If present, RedCap UEs use this UL BWP instead of initialUplinkBWP.

If absent, RedCap UEs use initialUplinkBWP provided that it does not exceed the RedCap UE maximum bandwidth (see also clause 5.2.2.4.2).

Uplink-PowerControl

The IE *Uplink-PowerControl* is used to configure UE specific power control parameter for PUSCH, PUCCH and SRS.

Uplink-PowerControl information element

```
-- ASN1START
-- TAG-UPLINK-POWERCONTROL-START
Uplink-powerControl-r17 ::= SEQUENCE {
    ul-powercontrolId-r17
                                Uplink-powerControlId-r17,
   p0AlphaSetforPUSCH-r17
                                POAlphaSet-r17
                                                                                                              OPTIONAL, -- Need R
   p0AlphaSetforPUCCH-r17
                                POAlphaSet-r17
                                                                                                              OPTIONAL, -- Need R
                                POAlphaSet-r17
    p0AlphaSetforSRS-r17
                                                                                                              OPTIONAL -- Need R
POAlphaSet-r17 ::=
                            SEQUENCE {
                                 INTEGER (-16..15)
    p0-r17
                                                                                                              OPTIONAL, -- Need R
                                                                                                              OPTIONAL, -- Need S
    alpha-r17
                                Alpha
    closedLoopIndex-r17
                                ENUMERATED { i0, i1 }
Uplink-powerControlId-r17 ::= INTEGER(1.. maxUL-TCI-r17)
-- TAG-UPLINK-POWERCONTROL-STOP
-- ASN1STOP
```

Uplink-PowerControl field descriptions

p0AlphaSetforPUSCH, p0AlphaSetforPUCCH, p0AlphaSetforSRS

Configures power control parameters for PUSCH, PUCCH and SRS (see TS 38.213 [13], clause 7.2). When the field *alpha* is absent in *p0AlphaSetforPUSCH*, the UE applies the value 1 for SRS power control. When the field *alpha* is absent in *p0AlphaSetForPUCCH*, the field alpha is absent (not used).

Uu-RelayRLC-ChannelConfig

The IE *Uu-RelayRLC-ChannelConfig* is used to configure an RLC entity, a corresponding logical channel in MAC for Uu Relay RLC channel between L2 U2N Relay UE and network.

Uu-RelayRLC-ChannelConfig information element

```
-- ASN1START
-- TAG-UURELAYRLCCHANNELCONFIG-START
Uu-RelayRLC-ChannelConfig-r17::= SEQUENCE {
                                  LogicalChannelIdentity
   uu-LogicalChannelIdentity-r17
                                                                         OPTIONAL, -- Cond RelayLCH-SetupOnly
   uu-RelayRLC-ChannelID-r17
                                  Uu-RelayRLC-ChannelID-r17,
   reestablishRLC-r17 ENUMERATED {true}
                                                                         OPTIONAL,
                                                                                    -- Need N
   rlc-Config-r17
                                RLC-Config
                                                                         OPTIONAL, -- Cond RelayLCH-Setup
   mac-LogicalChannelConfig-r17 LogicalChannelConfig
                                                                         OPTIONAL, -- Cond RelayLCH-Setup
-- TAG-UURELAYRLCCHANNELCONFIG-STOP
-- ASN1STOP
```

Uu-RelayRLC-ChannelConfig field descriptions		
uu-LogicalChannelldentity		
Indicates the logical channel id for Uu Relay RLC channel of the L2 U2N Relay UE.		
uu-RelayRLC-ChannelID		
Indicates the Uu Relay RLC channel in the link between L2 U2N Relay UE and network.		
reestablishRLC		
Indicates that RLC should be re-established.		
rlc-Config		
Determines the RLC mode (UM, AM) and provides corresponding parameters.		

Conditional Presence	Explanation
RelayLCH-Setup	This field is mandatory present upon creation of a new logical channel for a Uu Relay RLC channel. It is optionally present, Need M,
	otherwise.
RelayLCH-SetupOnly	This field is mandatory present upon creation of a new logical channel for a Uu Relay RLC channel. It is absent otherwise.

– Uu-RelayRLC-ChannelID

The IE Uu-RelayRLC-ChannelID is used to identify a Uu Relay RLC channel in the link between L2 U2N Relay UE and network.

Uu-RelayRLC-ChannelID information element

```
-- TAG-UURELAYRLCCHANNELID-START

Uu-RelayRLC-ChannelID-r17 ::= INTEGER (1..maxLC-ID)

-- TAG-UURELAYRLCCHANNELID-STOP

-- ASN1STOP
```

UplinkTxDirectCurrentList

The IE *UplinkTxDirectCurrentList* indicates the Tx Direct Current locations per serving cell for each configured UL BWP in the serving cell, based on the BWP numerology and the associated carrier bandwidth.

UplinkTxDirectCurrentList information element

```
-- ASN1START
-- TAG-UPLINKTXDIRECTCURRENTLIST-START
UplinkTxDirectCurrentList ::=
                                        SEQUENCE (SIZE (1..maxNrofServingCells)) OF UplinkTxDirectCurrentCell
UplinkTxDirectCurrentCell ::=
                                        SEOUENCE {
    servCellIndex
                                            ServCellIndex,
    uplinkDirectCurrentBWP
                                            SEQUENCE (SIZE (1..maxNrofBWPs)) OF UplinkTxDirectCurrentBWP,
    [ [
    uplinkDirectCurrentBWP-SUL
                                            SEQUENCE (SIZE (1..maxNrofBWPs)) OF UplinkTxDirectCurrentBWP
                                                                                                                        OPTIONAL
    11
UplinkTxDirectCurrentBWP ::=
                                        SEOUENCE {
    bwp-Id
                                            BWP-Id,
    shift7dot5kHz
                                            BOOLEAN,
    txDirectCurrentLocation
                                            INTEGER (0..3301)
-- TAG-UPLINKTXDIRECTCURRENTLIST-STOP
-- ASN1STOP
```

UplinkTxDirectCurrentBWP field descriptions

bwp-ld

The BWP-Id of the corresponding uplink BWP.

shift7dot5kHz

Indicates whether there is 7.5 kHz shift or not. 7.5 kHz shift is applied if the field is set to true. Otherwise 7.5 kHz shift is not applied.

txDirectCurrentLocation

The uplink Tx Direct Current location for the carrier. Only values in the value range of this field between 0 and 3299, which indicate the subcarrier index within the carrier corresponding to the numerology of the corresponding uplink BWP and value 3300, which indicates "Outside the carrier" and value 3301, which indicates "Undetermined position within the carrier" are used in this version of the specification.

UplinkTxDirectCurrentCell field descriptions

servCellIndex

The serving cell ID of the serving cell corresponding to the *uplinkDirectCurrentBWP*.

uplinkDirectCurrentBWP

The Tx Direct Current locations for all the uplink BWPs configured at the corresponding serving cell.

uplinkDirectCurrentBWP-SUL

The Tx Direct Current locations for all the supplementary uplink BWPs configured at the corresponding serving cell.

UplinkTxDirectCurrentMoreCarrierList

The IE *UplinkTxDirectCurrentMoreCarrierList* indicates the Tx Direct Current locations for intra-band CA including one, two or more uplink carriers. The UE does not report the uplink Direct Current location information for SUL carrier(s).

UplinkTxDirectCurrentMoreCarrierList information element

```
-- ASN1START
-- TAG-UPLINKTXDIRECTCURRENTMORECARRIERLIST-START
UplinkTxDirectCurrentMoreCarrierList-r17 ::= SEQUENCE (SIZE (1..maxNrofCC-Group-r17)) OF CC-Group-r17
CC-Group-r17 ::=
                          SEQUENCE {
    servCellIndexLower-r17
                              ServCellIndex,
    servCellIndexHigher-r17 ServCellIndex
                                                         OPTIONAL,
   defaultDC-Location-r17
                              DefaultDC-Location-r17,
    offsetToDefault-r17
                              CHOICE {
                             OffsetValue-r17,
       offsetValue
                                  SEQUENCE (SIZE(1..maxNrofReqComDC-Location-r17)) OF OffsetValue-r17
       offsetlist
                                                         OPTIONAL
OffsetValue-r17::=
                          SEOUENCE {
    offsetValue-r17
                              INTEGER (-20000.. 20000),
    shift7dot5kHz-r17
                              BOOLEAN
DefaultDC-Location-r17 ::= CHOICE {
   ul
                              FrequencyComponent-r17,
    dl
                              FrequencyComponent-r17,
    ulAndDL
                              FrequencyComponent-r17
FrequencyComponent-r17 ::= ENUMERATED {activeCarrier,configuredCarrier,activeBWP,configuredBWP}
-- TAG-UPLINKTXDIRECTCURRENTMORECARRIERLIST-STOP
-- ASN1STOP
```

UplinkTxDirectCurrentMoreCarrierList and CC-Group field descriptions

CC-Group

The contiguous carriers sharing the same PA in an intra-band UL CA configuration. The UE shall report only one DC location for an intra-band CC combination with one active uplink carrier in case *DefaultDC-Location* is set to *activeCarrier* or *activeBWP*.

defaultDC-Location

Indicates the default DC location derivation option. The default Tx Direct Current is located at the mathematical center of the UE bandwidth, i.e. between the lower edge of the lowest subcarrier of the lowest frequency component and the upper edge of the highest subcarrier of the highest frequency component, rounded to the subcarrier grid of the lowest SCS defined for the component carrier on which the default Direct Current is located. The lowest and highest frequency components used for derivation of mathematical center are indicated by *FrequencyComponent* in the associated *CC-Group*, where the lowest frequency component and the highest frequency component may be the same. If the mathematical center of the UE bandwidth lands on frequencies where there is no subcarrier grid defined, the subcarrier grid of the lowest SCS of the nearest lower frequency component carrier shall be extended to cover the frequency of the mathematical default Direct Current location.

offsetToDefault

Indicates the DC location offset to the default DC location derived from defaultDC-Location. The lowest SCS in the CC group is used as the offset granularity. Value 0 respresents no offset.

offsetValue is used in case *DefaultDC-Location* is set to *configuredCarrier* or *configuredBWP*. offsetlist is used in case *DefaultDC-Location* is set to *activeCarrier* or *activeBWP*. Each entity in this list corresponds to the entry in carriers combination in *IntraBandCC-CombinationReqList* of the intra-band CA component. For each CC group, the UE shall include the same number of entries, and listed in the same order as in CC-CombinationList. If *DefaultDC-Location* is set the *activeCarrier*, same offsetValue is signalled for all requested carriers combinations with same active carriers states(regardless of the active BWP index).

servCellIndexHigher

Indicates the serving cell index of the highest edge of the CC-Group. If asbsent, there is only one carrier in this group indicated by servCellIndexLower.

servCellIndexLower

Indicates the serving cell index of the lowest edge of the CC-Group.

shift7dot5kHz

Indicates whether there is 7.5 kHz shift or not. 7.5 kHz shift is applied if the field is set to true, otherwise 7.5 kHz shift is not applied.

DefaultDC-Location field descriptions

dl

Indicates that the default DC location is derived based on the DL frequencies of the frequency component.

ul

Indicates that the default DC location is derived based on the UL frequencies of the frequency component.

ulAndDL

Indicates that the default DC location is derived based on the edge most frequencies among any DL and UL frequency components.

UplinkTxDirectCurrentTwoCarrierList

The IE *UplinkTxDirectCurrentTwoCarrierList* indicates the Tx Direct Current locations when uplink intra-band CA with two carriers is configured, based on the configured carriers and BWP numerology and the associated carrier bandwidth of the carriers. The UE does not report the uplink Direct Current location information for SUL carrier(s).

UplinkTxDirectCurrentTwoCarrierList information element

- -- ASN1START
- -- TAG-UPLINKTXDIRECTCURRENTTWOCARRIERLIST-START

UplinkTxDirectCurrentTwoCarrierList-r16 ::= SEQUENCE (SIZE (1..maxNrofTxDC-TwoCarrier-r16)) OF UplinkTxDirectCurrentTwoCarrier-r16

```
UplinkTxDirectCurrentTwoCarrier-r16 ::=
                                             SEQUENCE {
    carrierOneInfo-r16
                                                 UplinkTxDirectCurrentCarrierInfo-r16.
    carrierTwoInfo-r16
                                                 UplinkTxDirectCurrentCarrierInfo-r16,
    singlePA-TxDirectCurrent-r16
                                                 UplinkTxDirectCurrentTwoCarrierInfo-r16,
    secondPA-TxDirectCurrent-r16
                                                 UplinkTxDirectCurrentTwoCarrierInfo-r16
                                                                                                    OPTIONAL
UplinkTxDirectCurrentCarrierInfo-r16 ::=
                                             SEOUENCE {
                                                 ServCellIndex,
    servCellIndex-r16
    servCellInfo-r16
                                                 CHOICE {
       bwp-Id-r16
                                                     BWP-Id,
       deactivatedCarrier-r16
                                                     ENUMERATED {deactivated}
UplinkTxDirectCurrentTwoCarrierInfo-r16 ::= SEQUENCE {
    referenceCarrierIndex-r16
                                                 ServCellIndex,
    shift7dot5kHz-r16
                                                 BOOLEAN,
    txDirectCurrentLocation-r16
                                                 INTEGER (0..3301)
-- TAG-UPLINKTXDIRECTCURRENTTWOCARRIERLIST-STOP
-- ASN1STOP
```

UplinkTxDirectCurrentTwoCarrierInfo field descriptions

referenceCarrierIndex

The serving cell ID of the carrier which is to be used as the reference for interpreting the Tx Direction Current location as reported using *txDirectCurrentLocation-r16*. The numerology of the uplink BWP ID reported with *bwp-ld-r16* for this serving cell is the numerology used for interpreting the reported subcarrier location.

shift7dot5kHz

Indicates whether there is 7.5 kHz shift or not. 7.5 kHz shift is applied if the field is set to true. Otherwise 7.5 kHz shift is not applied.

txDirectCurrentLocation

The uplink Tx Direct Current location for the two carrier uplink CA with the serving cells reported using *carrierOneInfo-r16* and *carrierTwoInfo-r16*. Values in the range of this field between 0 and 3299 indicate the subcarrier index of the uplink Tx Direct Current location with the subcarrier taken from the serving cell with ID *referenceCarrierIndex* and the numerology of the corresponding uplink BWP reported for this serving cell. Value 3300 indicates "Outside the carrier" and value 3301 indicates "Undetermined position within the carrier".

UplinkTxDirectCurrentCarrierInfo field descriptions

bwp-ld

The BWP ID of the serving cell which is part of the two carrier uplink carrier aggregation. The UE shall not report this field if the serving cell is reported as deactivated using deactivated Carrier-r16.

deactivatedCarrier

For the reported uplink Tx Direct Current location(s) corresponding to singlePA-TxDirectCurrent-r16, indicates whether the carrier is deactivated or not for this serving cell. If the carrier refers to the PCell, the UE shall not set this field to deactivated.

servCellIndex

The serving cell ID of the serving cell which is part of the two carrier uplink carrier aggregation.

UplinkTxDirectCurrentTwoCarrier field descriptions

carrierOneInfo

The serving cell ID and BWP ID of the first carrier of the uplink carrier aggregation for which the uplink Tx Direct Current location(s) are being reported.

carrierTwoInfo

The serving cell ID and BWP ID of the second carrier of the uplink carrier aggregation for which the uplink Tx Direct Current location(s) are being reported.

singlePA-TxDirectCurrent

The uplink Tx Direct Current location for the UE which support single PA for this uplink carrier aggregation. For the UEs which support dual PA for this uplink carrier aggregation, this field is for reporting the uplink Tx Direct Current location of the first PA.

secondPA-TxDirectCurrent

The uplink Tx Direct Current location used by the UE with the second PA for the UEs which support dual PA for this uplink carrier aggregation. This field shall be absent for the UplinkTxDirectCurrentTwoCarrier entity where deactivatedCarrier of carrierOneInfo or carrierTwoInfo is set to deactivated.

ZP-CSI-RS-Resource

The IE *ZP-CSI-RS-Resource* is used to configure a Zero-Power (ZP) CSI-RS resource (see TS 38.214 [19], clause 5.1.4.2). Reconfiguration of a *ZP-CSI-RS-Resource* between periodic or semi-persistent and aperiodic is not supported.

ZP-CSI-RS-Resource information element

```
-- ASN1START
-- TAG-ZP-CSI-RS-RESOURCE-START

ZP-CSI-RS-Resource ::= SEQUENCE {
    zp-CSI-RS-ResourceId ZP-CSI-RS-ResourceId,
    resourceMapping CSI-RS-ResourceMapping,
    periodicityAndOffset CSI-ResourcePeriodicityAndOffset OPTIONAL, --Cond PeriodicOrSemiPersistent
    ...
}

ZP-CSI-RS-ResourceId ::= INTEGER (0..maxNrofZP-CSI-RS-Resources-1)

-- TAG-ZP-CSI-RS-RESOURCE-STOP
-- ASN1STOP
```

ZP-CSI-RS-Resource field descriptions

periodicityAndOffset

Periodicity and slot offset for periodic/semi-persistent ZP-CSI-RS (see TS 38.214 [19], clause 5.1.4.2). Network always configures the UE with a value for this field for periodic and semi-persistent ZP-CSI-RS resource (as indicated in PDSCH-Config).

resourceMapping

OFDM symbol and subcarrier occupancy of the ZP-CSI-RS resource within a slot.

zp-CSI-RS-Resourceld

ZP CSI-RS resource configuration ID (see TS 38.214 [19], clause 5.1.4.2).

Conditional Presence	Explanation
PeriodicOrSemiPersistent	The field is optionally present, Need M, for periodic and semi-persistent ZP-CSI-RS-Resources (as indicated in PDSCH-
	Config). The field is absent otherwise.

ZP-CSI-RS-ResourceSet

The IE ZP-CSI-RS-ResourceSet refers to a set of ZP-CSI-RS-Resources using their ZP-CSI-RS-ResourceIds.

ZP-CSI-RS-ResourceSet information element

ZP-CSI-RS-ResourceSet field descriptions

zp-CSI-RS-ResourceldList

The list of ZP-CSI-RS-ResourceId identifying the ZP-CSI-RS-Resource elements belonging to this set.

ZP-CSI-RS-ResourceSetId

The IE ZP-CSI-RS-ResourceSetId identifies a ZP-CSI-RS-ResourceSet.

ZP-CSI-RS-ResourceSetId information element

```
-- ASN1START
-- TAG-ZP-CSI-RS-RESOURCESETID-START

ZP-CSI-RS-ResourceSetId ::= INTEGER (0..maxNrofZP-CSI-RS-ResourceSets-1)

-- TAG-ZP-CSI-RS-RESOURCESETID-STOP
-- ASN1STOP
```

6.3.3 UE capability information elements

AccessStratumRelease

The IE AccessStratumRelease indicates the release supported by the UE.

AccessStratumRelease information element

AppLayerMeasParameters 4 6 1

The IE AppLayerMeasParameters is used to convey the capabilities supported by the UE for application layer measurements.

AppLayerMeasParameters information element

```
-- ASN1START
-- TAG-APPLAYERMEASPARAMETERS-START
                                      SEQUENCE {
AppLayerMeasParameters-r17 ::=
                              ENUMERATED {supported}
ENUMERATED {supported}
ENUMERATED {supported}
   qoe-Streaming-MeasReport-r17
                                                                                                         OPTIONAL,
   goe-MTSI-MeasReport-r17
                                                                                                         OPTIONAL,
   qoe-VR-MeasReport-r17
                                          ENUMERATED {supported}
                                                                                                         OPTIONAL,
   OPTIONAL,
   ran-VisibleQoE-VR-MeasReport-r17
                                          ENUMERATED {supported}
                                                                                                         OPTIONAL,
   ul-MeasurementReportAppLayer-Seg-r17
                                          ENUMERATED {supported}
                                                                                                         OPTIONAL,
-- TAG-APPLAYERMEASPARAMETERS-STOP
```

BandCombinationList

-- ASN1STOP

The IE BandCombinationList contains a list of NR CA, NR non-CA and/or MR-DC band combinations (also including DL only or UL only band).

BandCombinationList information element

```
-- ASN1START
-- TAG-BANDCOMBINATIONLIST-START
BandCombinationList ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination
BandCombinationList-v1540 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1540
BandCombinationList-v1550 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1550
BandCombinationList-v1560 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1560
BandCombinationList-v1570 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1570
BandCombinationList-v1580 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1580
BandCombinationList-v1590 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1590
BandCombinationList-v15q0 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v15q0
BandCombinationList-v1610 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1610
BandCombinationList-v1630 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1630
BandCombinationList-v1640 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1640
BandCombinationList-v1650 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1650
BandCombinationList-v1680 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1680
BandCombinationList-v1690 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1690
BandCombinationList-v16a0 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v16a0
BandCombinationList-v1700 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1700
BandCombinationList-v1720 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1720
BandCombinationList-v1730 ::=
                                    SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1730
BandCombinationList-UplinkTxSwitch-r16 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-r16
BandCombinationList-UplinkTxSwitch-v1630 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1630
BandCombinationList-UplinkTxSwitch-v1640 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1640
BandCombinationList-UplinkTxSwitch-v1650 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1650
BandCombinationList-UplinkTxSwitch-v1670 ::= SEOUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1670
BandCombinationList-UplinkTxSwitch-v1690 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1690
BandCombinationList-UplinkTxSwitch-v16a0 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v16a0
```

```
BandCombinationList-UplinkTxSwitch-v1700 ::= SEOUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1700
BandCombinationList-UplinkTxSwitch-v1720 ::= SEOUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1720
BandCombinationList-UplinkTxSwitch-v1730 ::= SEOUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1730
BandCombination ::=
    bandList
                                        SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters,
    featureSetCombination
                                        FeatureSetCombinationId,
                                        CA-ParametersEUTRA
                                                                                      OPTIONAL,
    ca-ParametersEUTRA
    ca-ParametersNR
                                        CA-ParametersNR
                                                                                      OPTIONAL,
    mrdc-Parameters
                                        MRDC-Parameters
                                                                                      OPTIONAL,
    supportedBandwidthCombinationSet
                                        BIT STRING (SIZE (1..32))
                                                                                      OPTIONAL,
    powerClass-v1530
                                        ENUMERATED {pc2}
                                                                                      OPTIONAL
BandCombination-v1540::=
                                    SEOUENCE {
                                        SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1540,
    bandList-v1540
    ca-ParametersNR-v1540
                                        CA-ParametersNR-v1540
                                                                                      OPTIONAL
                                    SEOUENCE {
BandCombination-v1550 ::=
    ca-ParametersNR-v1550
                                        CA-ParametersNR-v1550
BandCombination-v1560::=
                                     SEOUENCE {
                                            ENUMERATED {supported}
    ne-DC-BC
                                                                                     OPTIONAL,
    ca-ParametersNRDC
                                            CA-ParametersNRDC
                                                                                     OPTIONAL,
    ca-ParametersEUTRA-v1560
                                            CA-ParametersEUTRA-v1560
                                                                                     OPTIONAL,
    ca-ParametersNR-v1560
                                            CA-ParametersNR-v1560
                                                                                     OPTIONAL
BandCombination-v1570 ::=
                                     SEQUENCE {
    ca-ParametersEUTRA-v1570
                                        CA-ParametersEUTRA-v1570
BandCombination-v1580 ::=
                                     SEOUENCE {
    mrdc-Parameters-v1580
                                        MRDC-Parameters-v1580
BandCombination-v1590::=
                                     SEQUENCE {
    supportedBandwidthCombinationSetIntraENDC BIT STRING (SIZE (1..32))
                                                                                     OPTIONAL,
    mrdc-Parameters-v1590
                                               MRDC-Parameters-v1590
BandCombination-v15g0::=
                                    SEQUENCE {
    ca-ParametersNR-v15q0
                                        CA-ParametersNR-v15q0
                                                                                     OPTIONAL,
    ca-ParametersNRDC-v15g0
                                        CA-ParametersNRDC-v15g0
                                                                                     OPTIONAL,
    mrdc-Parameters-v15g0
                                        MRDC-Parameters-v15g0
                                                                                     OPTIONAL
BandCombination-v1610 ::=
                                   SEOUENCE {
    bandList-v1610
                                        SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1610 OPTIONAL,
    ca-ParametersNR-v1610
                                        CA-ParametersNR-v1610
                                                                                OPTIONAL,
```

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```
CA-ParametersNRDC-v1610
    ca-ParametersNRDC-v1610
                                                                                 OPTIONAL,
    powerClass-v1610
                                         ENUMERATED {pcldot5}
                                                                                 OPTIONAL,
    powerClassNRPart-r16
                                         ENUMERATED {pc1, pc2, pc3, pc5}
                                                                                 OPTIONAL.
    featureSetCombinationDAPS-r16
                                         FeatureSetCombinationId
                                                                                 OPTIONAL,
    mrdc-Parameters-v1620
                                         MRDC-Parameters-v1620
                                                                                 OPTIONAL
BandCombination-v1630 ::=
                                             SEOUENCE {
    ca-ParametersNR-v1630
                                                 CA-ParametersNR-v1630
                                                                                                                     OPTIONAL,
    ca-ParametersNRDC-v1630
                                                 CA-ParametersNRDC-v1630
                                                                                                                     OPTIONAL,
                                                                                                                     OPTIONAL,
    mrdc-Parameters-v1630
                                                 MRDC-Parameters-v1630
    supportedTxBandCombListPerBC-Sidelink-r16
                                                 BIT STRING (SIZE (1..maxBandComb))
                                                                                                                     OPTIONAL,
                                                 BIT STRING (SIZE (1..maxBandComb))
    supportedRxBandCombListPerBC-Sidelink-r16
                                                                                                                     OPTIONAL,
    scalingFactorTxSidelink-r16
                                                 SEQUENCE (SIZE (1..maxBandComb)) OF ScalingFactorSidelink-r16
                                                                                                                     OPTIONAL,
    scalingFactorRxSidelink-r16
                                                 SEQUENCE (SIZE (1..maxBandComb)) OF ScalingFactorSidelink-r16
                                                                                                                     OPTIONAL
BandCombination-v1640 ::=
                                             SEOUENCE {
    ca-ParametersNR-v1640
                                                 CA-ParametersNR-v1640
                                                                                                                     OPTIONAL,
    ca-ParametersNRDC-v1640
                                                 CA-ParametersNRDC-v1640
                                                                                                                     OPTIONAL
BandCombination-v1650 ::=
                                   SEOUENCE {
    ca-ParametersNRDC-v1650
                                         CA-ParametersNRDC-v1650
                                                                                  OPTIONAL
BandCombination-v1680 ::=
                                   SEOUENCE {
    intrabandConcurrentOperationPowerClass-r16 SEOUENCE (SIZE (1..maxBandComb)) OF IntraBandPowerClass-r16
                                                                                                                  OPTIONAL
BandCombination-v1690 ::=
                                    SEQUENCE {
    ca-ParametersNR-v1690
                                        CA-ParametersNR-v1690
                                                                               OPTIONAL
BandCombination-v16a0 ::=
                                    SEOUENCE {
    ca-ParametersNR-v16a0
                                        CA-ParametersNR-v16a0
                                                                                  OPTIONAL,
    ca-ParametersNRDC-v16a0
                                        CA-ParametersNRDC-v16a0
                                                                                  OPTIONAL
BandCombination-v1700 ::=
                                    SEOUENCE {
    ca-ParametersNR-v1700
                                        CA-ParametersNR-v1700
                                                                                  OPTIONAL,
    ca-ParametersNRDC-v1700
                                        CA-ParametersNRDC-v1700
                                                                                  OPTIONAL,
    mrdc-Parameters-v1700
                                       MRDC-Parameters-v1700
                                                                                  OPTIONAL,
    bandList-v1710
                                        SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1710 OPTIONAL,
    supportedBandCombListPerBC-SL-RelayDiscovery-r17
                                                           BIT STRING (SIZE (1..maxBandComb))
                                                                                                             OPTIONAL,
    supportedBandCombListPerBC-SL-NonRelayDiscovery-r17
                                                           BIT STRING (SIZE (1..maxBandComb))
                                                                                                             OPTIONAL
BandCombination-v1720 ::=
                                    SEQUENCE {
    ca-ParametersNR-v1720
                                        CA-ParametersNR-v1720
                                                                                  OPTIONAL.
    ca-ParametersNRDC-v1720
                                        CA-ParametersNRDC-v1720
                                                                                  OPTIONAL
BandCombination-v1730 ::=
                                    SEOUENCE {
    ca-ParametersNR-v1730
                                        CA-ParametersNR-v1730
                                                                                  OPTIONAL,
```

```
ca-ParametersNRDC-v1730
                                       CA-ParametersNRDC-v1730
                                                                                 OPTIONAL,
    bandList-v1730
                                       SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1730 OPTIONAL
BandCombination-UplinkTxSwitch-r16 ::= SEQUENCE {
    bandCombination-r16
                                        BandCombination,
    bandCombination-v1540
                                        BandCombination-v1540
                                                                                    OPTIONAL,
    bandCombination-v1560
                                        BandCombination-v1560
                                                                                    OPTIONAL,
    bandCombination-v1570
                                        BandCombination-v1570
                                                                                    OPTIONAL,
    bandCombination-v1580
                                        BandCombination-v1580
                                                                                    OPTIONAL,
    bandCombination-v1590
                                        BandCombination-v1590
                                                                                    OPTIONAL,
    bandCombination-v1610
                                        BandCombination-v1610
                                                                                    OPTIONAL,
    supportedBandPairListNR-r16
                                        SEQUENCE (SIZE (1..maxULTxSwitchingBandPairs)) OF ULTxSwitchingBandPair-r16,
    uplinkTxSwitching-OptionSupport-r16 ENUMERATED {switchedUL, dualUL, both}
                                                                                    OPTIONAL,
    uplinkTxSwitching-PowerBoosting-r16 ENUMERATED {supported}
                                                                                    OPTIONAL,
    -- R4 16-5 UL-MIMO coherence capability for dynamic Tx switching between 3CC 1Tx-2Tx switching
                                                   ENUMERATED {nonCoherent, fullCoherent} OPTIONAL
    uplinkTxSwitching-PUSCH-TransCoherence-r16
    11
BandCombination-UplinkTxSwitch-v1630 ::=
                                            SEOUENCE {
    bandCombination-v1630
                                                BandCombination-v1630
                                                                                    OPTIONAL
BandCombination-UplinkTxSwitch-v1640 ::=
                                            SEOUENCE {
    bandCombination-v1640
                                                BandCombination-v1640
                                                                                    OPTIONAL
BandCombination-UplinkTxSwitch-v1650 ::= SEQUENCE {
    bandCombination-v1650
                                        BandCombination-v1650
                                                                                    OPTIONAL
BandCombination-UplinkTxSwitch-v1670 ::= SEOUENCE {
    bandCombination-v15g0
                                             BandCombination-v15g0
                                                                                    OPTIONAL
BandCombination-UplinkTxSwitch-v1690 ::= SEQUENCE {
    bandCombination-v1690
                                              BandCombination-v1690
                                                                                    OPTIONAL
BandCombination-UplinkTxSwitch-v16a0 ::= SEQUENCE {
    bandCombination-v16a0
                                             BandCombination-v16a0
                                                                                    OPTIONAL
BandCombination-UplinkTxSwitch-v1700 ::= SEOUENCE {
    bandCombination-v1700
                                             BandCombination-v1700
                                                                                         OPTIONAL,
    -- R4 16-1/16-2/16-3 Dynamic Tx switching between 2CC/3CC 2Tx-2Tx/1Tx-2Tx switching
    supportedBandPairListNR-v1700
                                             SEQUENCE (SIZE (1..maxULTxSwitchingBandPairs)) OF ULTxSwitchingBandPair-v1700 OPTIONAL,
    -- R4 16-6: UL-MIMO coherence capability for dynamic Tx switching between 2Tx-2Tx switching
    uplinkTxSwitchingBandParametersList-v1700 SEQUENCE (SIZE (1.. maxSimultaneousBands)) OF UplinkTxSwitchingBandParameters-v1700 OPTIONAL
```

```
BandCombination-UplinkTxSwitch-v1720 ::= SEQUENCE {
    bandCombination-v1720
                                              BandCombination-v1720
                                                                                    OPTIONAL.
    uplinkTxSwitching-OptionSupport2T2T-r17 ENUMERATED {switchedUL, dualUL, both} OPTIONAL
BandCombination-UplinkTxSwitch-v1730 ::= SEQUENCE {
    bandCombination-v1730
                                              BandCombination-v1730
                                                                                    OPTIONAL
ULTxSwitchingBandPair-r16 ::=
                                    SEOUENCE {
    bandIndexUL1-r16
                                        INTEGER(1..maxSimultaneousBands),
                                        INTEGER(1..maxSimultaneousBands),
    bandIndexUL2-r16
                                        ENUMERATED {n35us, n140us, n210us},
    uplinkTxSwitchingPeriod-r16
    uplinkTxSwitching-DL-Interruption-r16 BIT STRING (SIZE(1..maxSimultaneousBands)) OPTIONAL
ULTxSwitchingBandPair-v1700 ::=
                                     SEOUENCE -
    uplinkTxSwitchingPeriod2T2T-r17
                                        ENUMERATED {n35us, n140us, n210us}
                                                                                OPTIONAL
UplinkTxSwitchingBandParameters-v1700 ::=
                                                 SEQUENCE {
    bandIndex-r17
                                                     INTEGER(1..maxSimultaneousBands),
    uplinkTxSwitching2T2T-PUSCH-TransCoherence-r17 ENUMERATED {nonCoherent, fullCoherent}
                                                                                                        OPTIONAL
BandParameters ::=
                                        CHOICE {
                                        SEOUENCE {
    eutra
        bandEUTRA
                                            FreqBandIndicatorEUTRA,
        ca-BandwidthClassDL-EUTRA
                                            CA-BandwidthClassEUTRA
                                                                                    OPTIONAL,
        ca-BandwidthClassUL-EUTRA
                                            CA-BandwidthClassEUTRA
                                                                                    OPTIONAL
                                        SEQUENCE {
   nr
       bandNR
                                             FreqBandIndicatorNR,
        ca-BandwidthClassDL-NR
                                            CA-BandwidthClassNR
                                                                                    OPTIONAL,
        ca-BandwidthClassUL-NR
                                            CA-BandwidthClassNR
                                                                                    OPTIONAL
BandParameters-v1540 ::=
                                     SEOUENCE
    srs-CarrierSwitch
                                        CHOICE
       nr
                                            SEOUENCE {
            srs-SwitchingTimesListNR
                                                 SEQUENCE (SIZE (1..maxSimultaneousBands)) OF SRS-SwitchingTimeNR
        },
                                            SEOUENCE {
        eutra
            srs-SwitchingTimesListEUTRA
                                                 SEQUENCE (SIZE (1..maxSimultaneousBands)) OF SRS-SwitchingTimeEUTRA
                                                                                    OPTIONAL,
                                    SEQUENCE {
    srs-TxSwitch
        supportedSRS-TxPortSwitch
                                        ENUMERATED {t1r2, t1r4, t2r4, t1r4-t2r4, t1r1, t2r2, t4r4, notSupported},
        txSwitchImpactToRx
                                        INTEGER (1..32)
                                                                                    OPTIONAL,
        txSwitchWithAnotherBand
                                        INTEGER (1..32)
                                                                                    OPTIONAL
                                                                                    OPTIONAL
```

```
BandParameters-v1610 ::=
                                                                                SEOUENCE {
         srs-TxSwitch-v1610
                                                                                         SEOUENCE {
                   supportedSRS-TxPortSwitch-v1610 ENUMERATED {t1r1-t1r2, t1r1-t1r2-t1r4, t1r1-t1r2-t2r2-t2r4, t1r1-t1r2-t2r2-t2r4, t1r1-t1r2-t2r4, t1r1-t1r2-t1r4, t1r1-t1r4, t1r1
                                                                                                                                           t1r1-t2r2, t1r1-t2r2-t4r4}
                                                                                                                                                                                                           OPTIONAL
BandParameters-v1710 ::=
                                                                                SEOUENCE {
         -- R1 23-8-3 SRS Antenna switching for >4Rx
         srs-AntennaSwitchingBeyond4RX-r17
                                                                                                                                              SEQUENCE {
                   -- 1. Support of SRS antenna switching xTyR with y>4
                   supportedSRS-TxPortSwitchBeyond4Rx-r17
                                                                                                                                                       BIT STRING (SIZE (11)),
                   -- 2. Report the entry number of the first-listed band with UL in the band combination that affects this DL
                   entryNumberAffectBeyond4Rx-r17
                                                                                                                                                       INTEGER (1..32)
                                                                                                                                                                                                           OPTIONAL,
                   -- 3. Report the entry number of the first-listed band with UL in the band combination that switches together with this UL
                   entryNumberSwitchBeyond4Rx-r17
                                                                                                                                                       INTEGER (1..32)
                                                                                                                                                                                                           OPTIONAL
                                                                                                                                                                                                           OPTIONAL
BandParameters-v1730 ::= SEQUENCE {
         -- R1 39-3-2 Affected bands for inter-band CA during SRS carrier switching
         srs-SwitchingAffectedBandsListNR-r17 SEQUENCE (SIZE (1..maxSimultaneousBands)) OF SRS-SwitchingAffectedBandsNR-r17
ScalingFactorSidelink-r16 ::=
                                                                                        ENUMERATED {f0p4, f0p75, f0p8, f1}
IntraBandPowerClass-r16 ::=
                                                                                        ENUMERATED {pc2, pc3, spare6, spare5, spare4, spare3, spare2, spare1}
SRS-SwitchingAffectedBandsNR-r17 ::= BIT STRING (SIZE (1..maxSimultaneousBands))
-- TAG-BANDCOMBINATIONLIST-STOP
-- ASN1STOP
```

BandCombination field descriptions

BandCombinationList-v1540, BandCombinationList-v1550, BandCombinationList-v1560, BandCombinationList-v1570, BandCombinationList-v1580, BandCombinationList-v1590, BandCombinationList-v1590, BandCombinationList-v1640, BandCombinationList-v1650, BandCombinationList-v1680, BandCombinationList-v1690, BandCombinationList-v1640, BandCombinationList-v1650, BandCombinationList-v1780, BandCombinationList-v1720, BandCombinationList-v1730

The UE shall include the same number of entries, and listed in the same order, as in *BandCombinationList* (without suffix). If the field is included in *supportedBandCombinationListNEDC-Only-v1610*, the UE shall include the same number of entries, and listed in the same order, as in *BandCombinationList* of *supportedBandCombinationListNEDC-Only* (without suffix) field.

If the field is included in *supportedBandCombinationListNEDC-Only-v15a0*, the UE shall include the same number of entries, and listed in the same order, as in *BandCombinationList* (without suffix) of *supportedBandCombinationListNEDC-Only* (without suffix) field.

BandCombinationList-UplinkTxSwitch-r16, BandCombinationList-UplinkTxSwitch-v1630, BandCombinationList-UplinkTxSwitch-v1640, BandCombinationList-UplinkTxSwitch-v1650, BandCombinationList-UplinkTxSwitch-v1690, BandCombinationList-UplinkTxSwitch-v16a0, BandCombinationList-UplinkTxSwitch-v1700, BandCombinationList-UplinkTxSwitch-v1730

The UE shall include the same number of entries, and listed in the same order, as in BandCombinationList-UplinkTxSwitch-r16.

For the field of supportedBandCombinationList-UplinkTxSwitch-v1700, if the UE does not support 2Tx-2Tx switching for a given band combination, the field of supportedBandPairListNR-v1700 in the corresponding entry is absent.

ca-ParametersNRDC

If the field is included for a band combination in the NR capability container, the field indicates support of NR-DC. Otherwise, the field is absent.

featureSetCombinationDAPS

If this field is present for a band combination, it reports the feature set combination supported for the band combination when any DAPS bearer is configured.

ne-DC-BC

If the field is included for a band combination in the MR-DC capability container, the field indicates support of NE-DC. Otherwise, the field is absent.

supportedBandPairListNR-r16, supportedBandPairListNR-v1700

Indicates a list of band pair supporting UL Tx switching as defined in TS 38.101-1 [15] for a given band combination.

A UE supporting 2Tx-2Tx switching should include both of supportedBandPairListNR-r16 and supportedBandPairListNR-v1700. And the UE shall include the same number of entries listed in the same order as in supportedBandPairListNR-r16.

If the UE does not support 2Tx-2Tx switching for a given band pair, the field of uplinkTxSwitchingPeriod2T2T in the corresponding entry is absent.

srs-SwitchingTimesListNR

Indicates, for a particular pair of NR bands, the RF retuning time when switching between a NR carrier corresponding to this band entry and another (PUSCH-less) NR carrier corresponding to the band entry in the order indicated below:

- For the first NR band, the UE shall include the same number of entries for NR bands as in bandList, i.e. first entry corresponds to first NR band in bandList and so on,
- For the second NR band, the UE shall include one entry less, i.e. first entry corresponds to the second NR band in bandList and so on
- And so on

srs-SwitchingTimesListEUTRA

Indicates, for a particular pair of E-UTRA bands, the RF retuning time when switching between an E-UTRA carrier corresponding to this band entry and another (PUSCH-less) E-UTRA carrier corresponding to the band entry in the order indicated below:

- For the first E-UTRA band, the UE shall include the same number of entries for E-UTRA bands as in *bandList*, i.e. first entry corresponds to first E-UTRA band in *bandList* and so on.
- For the second E-UTRA band, the UE shall include one entry less, i.e. first entry corresponds to the second E-UTRA band in bandList and so on
- And so on

srs-TxSwitch

Indicates supported SRS antenna switch capability for the associated band. If the UE indicates support of SRS-SwitchingTimeNR, the UE is allowed to set this field for a band with associated FeatureSetUplinkld set to 0 for SRS carrier switching.

uplinkTxSwitchingBandParametersList-v1700

Indicates a list of per band per band combination capabilities for UL Tx switching.

BandCombinationListSidelinkEUTRA-NR

The IE BandCombinationListSidelinkEUTRA-NR contains a list of V2X sidelink and NR sidelink band combinations.

BandCombinationListSidelinkEUTRA-NR information element

```
-- ASN1START
-- TAG-BANDCOMBINATIONLISTSIDELINKEUTRANR-START
BandCombinationListSidelinkEUTRA-NR-r16 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombinationParametersSidelinkEUTRA-NR-r16
BandCombinationListSidelinkEUTRA-NR-v1630 ::= SEOUENCE (SIZE (1..maxBandComb)) OF BandCombinationParametersSidelinkEUTRA-NR-v1630
BandCombinationListSidelinkEUTRA-NR-v1710 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombinationParametersSidelinkEUTRA-NR-v1710
BandCombinationParametersSidelinkEUTRA-NR-r16 ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParametersSidelinkEUTRA-NR-r16
BandCombinationParametersSidelinkEUTRA-NR-v1630 ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParametersSidelinkEUTRA-NR-v1630
BandCombinationParametersSidelinkEUTRA-NR-v1710 ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParametersSidelinkEUTRA-NR-v1710
BandParametersSidelinkEUTRA-NR-r16 ::= CHOICE {
    eut.ra
                                          SEQUENCE {
       bandParametersSidelinkEUTRA1-r16
                                              OCTET STRING
                                                                                  OPTIONAL,
       bandParametersSidelinkEUTRA2-r16
                                              OCTET STRING
                                                                                  OPTIONAL
   nr
                                          SEOUENCE {
       bandParametersSidelinkNR-r16
                                              BandParametersSidelink-r16
BandParametersSidelinkEUTRA-NR-v1630 ::= CHOICE {
    eut.ra
                                            NULL,
                                            SEOUENCE {
    nr
       tx-Sidelink-r16
                                                ENUMERATED {supported}
                                                                                               OPTIONAL,
       rx-Sidelink-r16
                                                ENUMERATED {supported}
                                                                                               OPTIONAL,
       sl-CrossCarrierScheduling-r16
                                                ENUMERATED {supported}
                                                                                               OPTIONAL
BandParametersSidelinkEUTRA-NR-v1710 ::= CHOICE {
    eutra
                                            NULL,
                                            SEQUENCE {
        --32-4
        ENUMERATED {n8, n16},
           harq-TxProcessModeTwoSidelink-r17
           scs-CP-PatternTxSidelinkModeTwo-r17
                                                    CHOICE {
               fr1-r17
                                                        SEOUENCE {
                   scs-15kHz-r17
                                                            BIT STRING (SIZE (16))
                                                                                                 OPTIONAL,
                   scs-30kHz-r17
                                                            BIT STRING (SIZE (16))
                                                                                                 OPTIONAL,
                   scs-60kHz-r17
                                                           BIT STRING (SIZE (16))
                                                                                                 OPTIONAL
               fr2-r17
                                                        SEQUENCE {
```

```
scs-60kHz-r17
                                                             BIT STRING (SIZE (16))
                                                                                                    OPTIONAL,
                    scs-120kHz-r17
                                                             BIT STRING (SIZE (16))
                                                                                                    OPTIONAL
                                                                                                    OPTIONAL,
            extendedCP-Mode2PartialSensing-r17
                                                         ENUMERATED {supported}
                                                                                                    OPTIONAL,
           dl-openLoopPC-Sidelink-r17
                                                         ENUMERATED {supported}
                                                                                                    OPTIONAL
                                                                                                    OPTIONAL,
        --32-2a: Receiving NR sidelink of PSFCH
       rx-sidelinkPSFCH-r17
                                                 ENUMERATED {n5, n15, n25, n32, n35, n45, n50, n64} OPTIONAL,
        --32-5a-1
       tx-IUC-Scheme1-Mode2Sidelink-r17
                                                 ENUMERATED {supported}
                                                                                                    OPTIONAL,
        tx-IUC-Scheme2-Mode2Sidelink-r17
                                                 ENUMERATED {n4, n8, n16}
                                                                                                    OPTIONAL
BandParametersSidelink-r16 ::= SEOUENCE {
    fregBandSidelink-r16
                                   FregBandIndicatorNR
-- TAG-BANDCOMBINATIONLISTSIDELINKEUTRANR-STOP
-- ASN1STOP
```

BandParametersSidelinkEUTRA-NR field descriptions

bandParametersSidelinkEUTRA1, bandParametersSidelinkEUTRA2

This field includes the V2X-BandParameters-r14 and V2X-BandParameters-v1530 IE as specified in 36.331 [10]. It is used for reporting the per-band capability for V2X sidelink communication.

BandCombinationListSL-Discovery

The IE BandCombinationListSL-Discovery contains a list of NR Sidelink discovery band combinations.

BandCombinationListSidelinkSL-Discovery information element

```
-- ASN1START
-- TAG-BANDCOMBINATIONLISTSLDISCOVERY-START
BandCombinationListSL-Discovery-r17 ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParametersSidelinkDiscovery-r17
BandParametersSidelinkDiscovery-r17 ::= SEQUENCE {
   sl-CrossCarrierScheduling-r17
                                         ENUMERATED {supported}
                                                                                        OPTIONAL,
   --R1 32-4: Transmitting NR sidelink mode 2 with partial sensing
   harg-TxProcessModeTwoSidelink-r17
                                            ENUMERATED {n8, n16},
       scs-CP-PatternTxSidelinkModeTwo-r17
                                             CHOICE {
          fr1-r17
                                                SEQUENCE {
              scs-15kHz-r17
                                                    BIT STRING (SIZE (16))
                                                                                        OPTIONAL,
              scs-30kHz-r17
                                                    BIT STRING (SIZE (16))
                                                                                        OPTIONAL,
              scs-60kHz-r17
                                                                                        OPTIONAL
                                                    BIT STRING (SIZE (16))
```

```
fr2-r17
                                                     SEQUENCE {
                                                         BIT STRING (SIZE (16))
                scs-60kHz-r17
                                                                                                OPTIONAL,
                scs-120kHz-r17
                                                         BIT STRING (SIZE (16))
                                                                                                OPTIONAL
                                                                                                OPTIONAL,
        extendedCP-Mode2PartialSensing-r17
                                                     ENUMERATED {supported}
                                                                                                OPTIONAL,
                                                     ENUMERATED {supported}
        dl-openLoopPC-Sidelink-r17
                                                                                                OPTIONAL
                                                                                                OPTIONAL,
    -R1 32-5a-1: Transmitting Inter-UE coordination scheme 1 in NR sidelink mode 2
    tx-IUC-Schemel-Mode2Sidelink-r17
                                             ENUMERATED {supported}
                                                                                                OPTIONAL
-- TAG-BANDCOMBINATIONLISTSLDISCOVERY-STOP
-- ASN1STOP
```

CA-BandwidthClassEUTRA

The IE CA-BandwidthClassEUTRA indicates the E-UTRA CA bandwidth class as defined in TS 36.101 [22], table 5.6A-1.

CA-BandwidthClassEUTRA information element

```
-- ASN1START
-- TAG-CA-BANDWIDTHCLASSEUTRA-START

CA-BandwidthClassEUTRA ::= ENUMERATED {a, b, c, d, e, f, ...}

-- TAG-CA-BANDWIDTHCLASSEUTRA-STOP
-- ASN1STOP
```

CA-BandwidthClassNR

The IE CA-BandwidthClassNR indicates the NR CA bandwidth class as defined in TS 38.101-1 [15], table 5.3A.5-1 and TS 38.101-2 [39], table 5.3A.4-1.

CA-BandwidthClassNR information element

```
-- ASN1START
-- TAG-CA-BANDWIDTHCLASSNR-START

-- R4 17-6: new CA BW Classes R2-R12

CA-BandwidthClassNR ::= ENUMERATED {a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, ...,r2-v1730, r3-v1730, r4-v1730, r5-v1730, r6-v1730, r7-v1730, r8-v1730, r9-v1730, r10-v1730, r11-v1730, r12-v1730 }

-- TAG-CA-BANDWIDTHCLASSNR-STOP
-- ASN1STOP
```

CA-ParametersEUTRA

The IE CA-ParametersEUTRA contains the E-UTRA part of band combination parameters for a given MR-DC band combination.

NOTE: If additional E-UTRA band combination parameters are defined in TS 36.331 [10], which are supported for MR-DC, they will be defined here as well.

CA-ParametersEUTRA information element

```
-- ASN1START
-- TAG-CA-PARAMETERSEUTRA-START
CA-ParametersEUTRA ::=
                                                SEOUENCE {
   multipleTimingAdvance
                                                     ENUMERATED {supported}
                                                                                                     OPTIONAL,
    simultaneousRx-Tx
                                                    ENUMERATED {supported}
                                                                                                     OPTIONAL,
                                                    BIT STRING (SIZE (1..8))
    supportedNAICS-2CRS-AP
                                                                                                     OPTIONAL,
    additionalRx-Tx-PerformanceReq
                                                    ENUMERATED {supported}
                                                                                                     OPTIONAL,
                                                    ENUMERATED {class2}
    ue-CA-PowerClass-N
                                                                                                     OPTIONAL,
    supportedBandwidthCombinationSetEUTRA-v1530
                                                    BIT STRING (SIZE (1..32))
                                                                                                     OPTIONAL,
CA-ParametersEUTRA-v1560 ::=
                                                SEQUENCE {
                                                     INTEGER (2..128)
    fd-MIMO-TotalWeightedLayers
                                                                                                      OPTIONAL
CA-ParametersEUTRA-v1570 ::=
                                                SEOUENCE {
                                                    INTEGER (0..10)
    dl-1024QAM-TotalWeightedLayers
                                                                                                     OPTIONAL
-- TAG-CA-PARAMETERSEUTRA-STOP
-- ASN1STOP
```

CA-ParametersNR

The IE CA-ParametersNR contains carrier aggregation and inter-frequency DAPS handover related capabilities that are defined per band combination.

CA-ParametersNR information element

```
-- ASN1START
-- TAG-CA-PARAMETERSNR-START
CA-ParametersNR ::=
                                    SEOUENCE {
    dummy
                                                  ENUMERATED {supported}
                                                                               OPTIONAL,
    parallelTxSRS-PUCCH-PUSCH
                                                  ENUMERATED {supported}
                                                                               OPTIONAL,
   parallelTxPRACH-SRS-PUCCH-PUSCH
                                                  ENUMERATED {supported}
                                                                               OPTIONAL,
                                                  ENUMERATED {supported}
    simultaneousRxTxInterBandCA
                                                                               OPTIONAL,
```

```
simultaneousRxTxSUL
                                                   ENUMERATED
                                                              {supported}
                                                                                OPTIONAL,
    diffNumerologyAcrossPUCCH-Group
                                                   ENUMERATED
                                                               {supported}
                                                                                OPTIONAL,
    diffNumerologyWithinPUCCH-GroupSmallerSCS
                                                   ENUMERATED
                                                               {supported}
                                                                                OPTIONAL.
    supportedNumberTAG
                                                   ENUMERATED {n2, n3, n4}
                                                                                OPTIONAL,
    . . .
CA-ParametersNR-v1540 ::=
                                     SEOUENCE {
    simultaneousSRS-AssocCSI-RS-AllCC
                                                             INTEGER (5..32)
                                                                                      OPTIONAL.
    csi-RS-IM-ReceptionForFeedbackPerBandComb
                                                             SEQUENCE {
        maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC
                                                                 INTEGER (1..64)
                                                                                      OPTIONAL,
        totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC
                                                                 INTEGER (2..256)
                                                                                      OPTIONAL
                                                                                      OPTIONAL.
    simultaneousCSI-ReportsAllCC
                                                             INTEGER (5..32)
                                                                                      OPTIONAL.
    dualPA-Architecture
                                                             ENUMERATED {supported}
                                                                                      OPTIONAL
CA-ParametersNR-v1550 ::=
                                     SEOUENCE
    dummy
                                         ENUMERATED {supported}
                                                                                      OPTIONAL
CA-ParametersNR-v1560 ::=
                                     SEOUENCE {
                                                   ENUMERATED {supported}
    diffNumerologyWithinPUCCH-GroupLargerSCS
                                                                                      OPTTONAL.
CA-ParametersNR-v15q0 ::=
                                     SEOUENCE {
    simultaneousRxTxInterBandCAPerBandPair
                                                   SimultaneousRxTxPerBandPair
                                                                                      OPTIONAL,
    simultaneousRxTxSULPerBandPair
                                                   SimultaneousRxTxPerBandPair
                                                                                      OPTIONAL
CA-ParametersNR-v1610 ::=
                                     SEOUENCE
     -- R1 9-3: Parallel MsqA and SRS/PUCCH/PUSCH transmissions across CCs in inter-band CA
    parallelTxMsgA-SRS-PUCCH-PUSCH-r16
                                                       ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 9-4: MsgA operation in a band combination including SUL
    msqA-SUL-r16
                                                       ENUMERATED {supported}
                                                                                      OPTIONAL.
    -- R1 10-9c: Joint search space group switching across multiple cells
                                                       ENUMERATED {supported}
    jointSearchSpaceSwitchAcrossCells-r16
                                                                                      OPTIONAL,
    -- R1 14-5: Half-duplex UE behaviour in TDD CA for same SCS
    half-DuplexTDD-CA-SameSCS-r16
                                                       ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 18-4: SCell dormancy within active time
    scellDormancyWithinActiveTime-r16
                                                       ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 18-4a: SCell dormancy outside active time
    scellDormancyOutsideActiveTime-r16
                                                       ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 18-6: Cross-carrier A-CSI RS triggering with different SCS
    crossCarrierA-CSI-trigDiffSCS-r16
                                                       ENUMERATED {higherA-CSI-SCS.lowerA-CSI-SCS.both}
                                                                                                           OPTIONAL,
    -- R1 18-6a: Default QCL assumption for cross-carrier A-CSI-RS triggering
    defaultQCL-CrossCarrierA-CSI-Trig-r16
                                                       ENUMERATED {diffOnly, both}
                                                                                      OPTIONAL.
    -- R1 18-7: CA with non-aligned frame boundaries for inter-band CA
    interCA-NonAlignedFrame-r16
                                                       ENUMERATED {supported}
                                                                                      OPTIONAL.
    simul-SRS-Trans-BC-r16
                                                       ENUMERATED {n2}
                                                                                      OPTIONAL,
    interFreqDAPS-r16
                                                       SEOUENCE
        interFreqAsyncDAPS-r16
                                                           ENUMERATED {supported}
                                                                                      OPTIONAL,
        interFreqDiffSCS-DAPS-r16
                                                           ENUMERATED {supported}
                                                                                      OPTIONAL,
        interFreqMultiUL-TransmissionDAPS-r16
                                                           ENUMERATED {supported}
                                                                                      OPTIONAL,
```

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interFregSemiStaticPowerSharingDAPS-Model-r16
                                                                     {supported}
                                                          ENUMERATED
                                                                                     OPTIONAL,
        interFreqSemiStaticPowerSharingDAPS-Mode2-r16
                                                          ENUMERATED
                                                                      {supported}
                                                                                     OPTIONAL,
        interFreqDynamicPowerSharingDAPS-r16
                                                          ENUMERATED
                                                                      {short, long}
                                                                                    OPTIONAL.
        interFreqUL-TransCancellationDAPS-r16
                                                          ENUMERATED {supported}
                                                                                     OPTIONAL
                                                                                     OPTIONAL.
                                                      CodebookParameters-v1610
    codebookParametersPerBC-r16
                                                                                     OPTIONAL,
    -- R1 16-2a-10 Value of R for BD/CCE
    blindDetectFactor-r16
                                                      INTEGER (1..2)
                                                                                     OPTIONAL.
    -- R1 11-2a: Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs per span when configured
    -- with DL CA with Rel-16 PDCCH monitoring capability on all the serving cells
    pdcch-MonitoringCA-r16
                                                      SEOUENCE {
        maxNumberOfMonitoringCC-r16
                                                          INTEGER (2..16),
        supportedSpanArrangement-r16
                                                          ENUMERATED {alignedOnly, alignedAndNonAligned}
                                                                                     OPTIONAL.
    -- R1 11-2c: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 16 and Rel. 15 PDCCH monitoring capabilities on
    -- different carriers
    pdcch-BlindDetectionCA-Mixed-r16
                                                      SEOUENCE {
        pdcch-BlindDetectionCA1-r16
                                                          INTEGER (1..15),
        pdcch-BlindDetectionCA2-r16
                                                          INTEGER (1..15),
        supportedSpanArrangement-r16
                                                          ENUMERATED {alignedOnly, alignedAndNonAligned}
                                                                                     OPTIONAL.
    -- R1 11-2d: Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs per span for MCG and for
    -- SCG when configured for NR-DC operation with Rel-16 PDCCH monitoring capability on all the serving cells
    pdcch-BlindDetectionMCG-UE-r16
                                                      INTEGER (1..14)
                                                                                    OPTIONAL,
    pdcch-BlindDetectionSCG-UE-r16
                                                      INTEGER (1..14)
                                                                                     OPTIONAL,
    -- R1 11-2e: Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 16 and
    -- Rel. 15 PDCCH monitoring capabilities on different carriers
    pdcch-BlindDetectionMCG-UE-Mixed-r16
                                                      SEOUENCE {
        pdcch-BlindDetectionMCG-UE1-r16
                                                          INTEGER (0..15),
       pdcch-BlindDetectionMCG-UE2-r16
                                                          INTEGER (0..15)
                                                                                     OPTIONAL,
    pdcch-BlindDetectionSCG-UE-Mixed-r16
                                                      SEQUENCE {
        pdcch-BlindDetectionSCG-UE1-r16
                                                          INTEGER (0..15),
        pdcch-BlindDetectionSCG-UE2-r16
                                                          INTEGER (0..15)
                                                                                     OPTIONAL.
    -- R1 18-5 cross-carrier scheduling with different SCS in DL CA
                                                      ENUMERATED {low-to-high, high-to-low, both} OPTIONAL,
    crossCarrierSchedulingDL-DiffSCS-r16
    -- R1 18-5a Default OCL assumption for cross-carrier scheduling
    crossCarrierSchedulingDefaultOCL-r16
                                                      ENUMERATED {diff-only, both} OPTIONAL,
    -- R1 18-5b cross-carrier scheduling with different SCS in UL CA
    crossCarrierSchedulingUL-DiffSCS-r16
                                                      ENUMERATED {low-to-high, high-to-low, both} OPTIONAL,
    -- R1 13.19a Simultaneous positioning SRS and MIMO SRS transmission for a given BC
    simul-SRS-MIMO-Trans-BC-r16
                                                      ENUMERATED {n2}
                                                                                     OPTIONAL,
    -- R1 16-3a, 16-3a-1, 16-3b, 16-3b-1: New Individual Codebook
    codebookParametersAdditionPerBC-r16
                                                      CodebookParametersAdditionPerBC-r16
                                                                                                   OPTIONAL.
    -- R1 16-8: Mixed codebook
    codebookComboParametersAdditionPerBC-r16
                                                      CodebookComboParametersAdditionPerBC-r16
                                                                                                   OPTIONAL
CA-ParametersNR-v1630 ::= SEOUENCE {
    -- R1 22-5b: Simultaneous transmission of SRS for antenna switching and SRS for CB/NCB /BM for inter-band UL CA
    -- R1 22-5d: Simultaneous transmission of SRS for antenna switching for inter-band UL CA
    simulTX-SRS-AntSwitchingInterBandUL-CA-r16
                                                      SimulSRS-ForAntennaSwitching-r16
                                                                                                   OPTIONAL,
    -- R4 8-5: supported beam management type for inter-band CA
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beamManagementType-r16
                                                      ENUMERATED {ibm, dummy}
                                                                                                     OPTIONAL,
    -- R4 7-3a: UL frequency separation class with aggregate BW and Gap BW
    intraBandFreqSeparationUL-AggBW-GapBW-r16
                                                      ENUMERATED {classI, classII, classIII}
                                                                                                   OPTIONAL.
    -- RAN 89: Case B in case of Inter-band CA with non-aligned frame boundaries
    interCA-NonAlignedFrame-B-r16
                                                      ENUMERATED {supported}
                                                                                                   OPTIONAL
CA-ParametersNR-v1640 ::= SEOUENCE {
    -- R4 7-5: Support of reporting UL Tx DC locations for uplink intra-band CA.
    uplinkTxDC-TwoCarrierReport-r16
                                                                   ENUMERATED {supported}
                                                                                                   OPTIONAL,
    -- RAN 22-6: Support of up to 3 different numerologies in the same NR PUCCH group for NR part of EN-DC, NGEN-DC, NE-DC and NR-CA
    -- where UE is not configured with two NR PUCCH groups
    maxUpTo3Diff-NumerologiesConfigSinglePUCCH-grp-r16
                                                                   PUCCH-Grp-CarrierTypes-r16
                                                                                                   OPTIONAL,
    -- RAN 22-6a: Support of up to 4 different numerologies in the same NR PUCCH group for NR part of EN-DC, NGEN-DC, NE-DC and NR-CA
    -- where UE is not configured with two NR PUCCH groups
    maxUpTo4Diff-NumerologiesConfigSinglePUCCH-grp-r16
                                                                  PUCCH-Grp-CarrierTypes-r16
                                                                                                   OPTIONAL.
    -- RAN 22-7: Support two PUCCH groups for NR-CA with 3 or more bands with at least two carrier types
    twoPUCCH-Grp-ConfigurationsList-r16 SEOUENCE (SIZE (1..maxTwoPUCCH-Grp-ConfigList-r16)) OF TwoPUCCH-Grp-Configurations-r16 OPTIONAL,
    -- R1 22-7a: Different numerology across NR PUCCH groups
    diffNumerologyAcrossPUCCH-Group-CarrierTypes-r16
                                                                   ENUMERATED {supported}
                                                                                                   OPTIONAL,
    -- R1 22-7b: Different numerologies across NR carriers within the same NR PUCCH group, with PUCCH on a carrier of smaller SCS
    diffNumerologyWithinPUCCH-GroupSmallerSCS-CarrierTypes-r16
                                                                   ENUMERATED {supported}
                                                                                                   OPTIONAL,
    -- R1 22-7c: Different numerologies across NR carriers within the same NR PUCCH group, with PUCCH on a carrier of larger SCS
    diffNumerologyWithinPUCCH-GroupLargerSCS-CarrierTypes-r16
                                                                   ENUMERATED {supported}
                                                                                                   OPTIONAL,
    -- R1 11-2f: add the replicated FGs of 11-2a/c with restriction for non-aligned span case
    -- with DL CA with Rel-16 PDCCH monitoring capability on all the serving cells
    pdcch-MonitoringCA-NonAlignedSpan-r16
                                                                   INTEGER (2..16)
                                                                                                   OPTIONAL,
    -- R1 11-2q: add the replicated FGs of 11-2a/c with restriction for non-aligned span case
    pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-r16
                                                                  SEOUENCE {
        pdcch-BlindDetectionCA1-r16
                                                                       INTEGER (1..15),
        pdcch-BlindDetectionCA2-r16
                                                                       INTEGER (1..15)
                                                                                                   OPTIONAL
CA-ParametersNR-v1690 ::= SEOUENCE {
    csi-ReportingCrossPUCCH-Grp-r16
                                             SEOUENCE {
        computationTimeForA-CSI-r16
                                                 ENUMERATED {sameAsNoCross, relaxed},
        additionalSymbols-r16
                                                  SEOUENCE {
            scs-15kHz-additionalSymbols-r16
                                                     ENUMERATED {s14, s28}
                                                                                       OPTIONAL,
            scs-30kHz-additionalSymbols-r16
                                                     ENUMERATED {s14, s28}
                                                                                       OPTIONAL,
            scs-60kHz-additionalSymbols-r16
                                                     ENUMERATED {s14, s28, s56}
                                                                                       OPTIONAL,
            scs-120kHz-additionalSymbols-r16
                                                     ENUMERATED {s14, s28, s56}
                                                                                       OPTIONAL
                                                                                       OPTIONAL,
        sp-CSI-ReportingOnPUCCH-r16
                                                  ENUMERATED {supported}
                                                                                       OPTIONAL,
        sp-CSI-ReportingOnPUSCH-r16
                                                  ENUMERATED {supported}
                                                                                       OPTIONAL.
                                                  SEQUENCE (SIZE (1..maxCarrierTypePairList-r16)) OF CarrierTypePair-r16
        carrierTypePairList-r16
                                                                                       OPTIONAL
CA-ParametersNR-v16a0 ::= SEQUENCE {
    pdcch-BlindDetectionMixedList-r16
                                         SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetectionMixed-1-r16)) OF PDCCH-BlindDetectionMixedList-r16
CA-ParametersNR-v1700 ::= SEQUENCE {
```

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-- R1 23-9-1: Basic Features of Further Enhanced Port-Selection Type II Codebook (FeType-II) per band combination information
    codebookParametersfetype2PerBC-r17
                                                     CodebookParametersfetype2PerBC-r17
                                                                                                  OPTIONAL.
    -- R4 18-4: Support of enhanced Demodulation requirements for CA in HST SFN FR1
    demodulationEnhancementCA-r17
                                                     ENUMERATED {supported}
                                                                                                  OPTIONAL,
    -- R4 20-1: Maximum uplink duty cycle for NR inter-band CA power class 2
    maxUplinkDutyCycle-interBandCA-PC2-r17
                                                     ENUMERATED {n50, n60, n70, n80, n90, n100}
                                                                                                  OPTIONAL,
    -- R4 20-2: Maximum uplink duty cycle for NR SUL combination power class 2
    maxUplinkDutvCvcle-SULcombination-PC2-r17
                                                     ENUMERATED {n50, n60, n70, n80, n90, n100}
                                                                                                  OPTIONAL,
    beamManagementType-CBM-r17
                                                     ENUMERATED {supported}
                                                                                                  OPTIONAL,
    -- R1 25-18: Parallel PUCCH and PUSCH transmission across CCs in inter-band CA
                                                     ENUMERATED {supported}
    parallelTxPUCCH-PUSCH-r17
                                                                                OPTIONAL,
    -- R1 23-9-5 Active CSI-RS resources and ports for mixed codebook types in any slot per band combination
                                                     CodebookComboParameterMixedTypePerBC-r17
    codebookComboParameterMixedTypePerBC-r17
                                                                                                  OPTIONAL,
   -- R1 23-7-1 Basic Features of CSI Enhancement for Multi-TRP
    mTRP-CSI-EnhancementPerBC-r17
                                                     SEOUENCE {
        maxNumNZP-CSI-RS-r17
                                                         INTEGER (2..8),
                                                         ENUMERATED {mode1, mode2, both},
        cSI-Report-mode-r17
        supportedComboAcrossCCs-r17
                                                        SEQUENCE (SIZE (1..16)) OF CSI-MultiTRP-SupportedCombinations-r17,
        OPTIONAL,
     -- R1 23-7-1b Active CSI-RS resources and ports in the presence of multi-TRP CSI
                                                     CodebookComboParameterMultiTRP-PerBC-r17
    codebookComboParameterMultiTRP-PerBC-r17
                                                                                                  OPTIONAL,
    -- R1 24-8b: 32 DL HARQ processes for FR 2-2 - maximum number of component carriers
    maxCC-32-DL-HARO-ProcessFR2-2-r17
                                                     ENUMERATED {n1, n2, n3, n4, n6, n8, n16, n32} OPTIONAL,
    -- R1 24-9b: 32 UL HARO processes for FR 2-2 - maximum number of component carriers
    maxCC-32-UL-HARO-ProcessFR2-2-r17
                                                     ENUMERATED {n1, n2, n3, n4, n5, n8, n16, n32} OPTIONAL,
    -- R1 34-2: Cross-carrier scheduling from SCell to PCell/PSCell (Type B)
    crossCarrierSchedulingSCell-SpCellTypeB-r17
                                                     CrossCarrierSchedulingSCell-SpCell-r17
                                                                                                  OPTIONAL,
  R1 34-1: Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A)
    crossCarrierSchedulingSCell-SpCellTypeA-r17
                                                     CrossCarrierSchedulingSCell-SpCell-r17
                                                                                                  OPTIONAL,
    -- R1 34-1a: DCI formats on PCell/PSCell USS set(s) support
    dci-FormatsPCellPSCellUSS-Sets-r17
                                                     ENUMERATED {supported}
                                                                                                  OPTIONAL,
    -- R1 34-3: Disabling scaling factor alpha when sSCell is deactivated
    disablingScalingFactorDeactSCell-r17
                                                     ENUMERATED {supported}
                                                                                                  OPTIONAL,
    -- R1 34-4: Disabling scaling factor alpha when sSCell is deactivated
    disablingScalingFactorDormantSCell-r17
                                                     ENUMERATED {supported}
                                                                                                  OPTIONAL,
    -- R1 34-5: Non-aligned frame boundaries between PCell/PSCell and sSCell
    non-AlignedFrameBoundaries-r17 SEQUENCE {
        scs15kHz-15kHz-r17
                                                     BIT STRING (SIZE (1..496))
                                                                                                  OPTIONAL,
        scs15kHz-30kHz-r17
                                                     BIT STRING (SIZE (1..496))
                                                                                                  OPTIONAL,
        scs15kHz-60kHz-r17
                                                     BIT STRING (SIZE (1..496))
                                                                                                  OPTIONAL,
        scs30kHz-30kHz-r17
                                                    BIT STRING (SIZE (1..496))
                                                                                                  OPTIONAL,
       scs30kHz-60kHz-r17
                                                     BIT STRING (SIZE (1..496))
                                                                                                  OPTIONAL,
        scs60kHz-60kHz-r17
                                                     BIT STRING (SIZE (1..496))
                                                                                                  OPTIONAL
                                                                                                  OPTIONAL
CA-ParametersNR-v1720 ::= SEQUENCE {
    -- R1 39-1: Parallel SRS and PUCCH/PUSCH transmission across CCs in intra-band non-contiquous CA
                                                     ENUMERATED {supported}
    parallelTxSRS-PUCCH-PUSCH-intraBand-r17
                                                                                                  OPTIONAL,
    -- R1 39-2: Parallel PRACH and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiquous CA
    parallelTxPRACH-SRS-PUCCH-PUSCH-intraBand-r17
                                                     ENUMERATED {supported}
                                                                                                  OPTIONAL,
    -- R1 25-9: Semi-static PUCCH cell switching for a single PUCCH group only
    semiStaticPUCCH-CellSwitchSingleGroup-r17
                                                     SEOUENCE {
```

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ENUMERATED {primaryGroupOnly, secondaryGroupOnly, eitherPrimaryOrSecondaryGroup},
   pucch-Group-r17
   pucch-Group-Config-r17
                                                     PUCCH-Group-Config-r17
                                                                                              OPTIONAL.
-- R1 25-9a: Semi-static PUCCH cell switching for two PUCCH groups
semiStaticPUCCH-CellSwitchTwoGroups-r17 SEOUENCE (SIZE (1..maxTwoPUCCH-Grp-ConfigList-r17)) OF TwoPUCCH-Grp-Configurations-r17 OPTIONAL,
-- R1 25-10: PUCCH cell switching based on dynamic indication for same length of overlapping PUCCH slots/sub-slots for a single
-- PUCCH group only
dvnamicPUCCH-CellSwitchSameLengthSingleGroup-r17 SEOUENCE {
   pucch-Group-r17
                                                     ENUMERATED {primaryGroupOnly, secondaryGroupOnly, eitherPrimaryOrSecondaryGroup},
   pucch-Group-Config-r17
                                                PUCCH-Group-Config-r17
                                                                                              OPTIONAL,
-- R1 25-10a: PUCCH cell switching based on dynamic indication for different length of overlapping PUCCH slots/sub-slots
-- for a single PUCCH group only
dynamicPUCCH-CellSwitchDiffLengthSingleGroup-r17 SEOUENCE {
   pucch-Group-r17
                                                     ENUMERATED {primaryGroupOnly, secondaryGroupOnly, eitherPrimaryOrSecondaryGroup},
   pucch-Group-Config-r17
                                                     PUCCH-Group-Config-r17
-- R1 25-10b: PUCCH cell switching based on dynamic indication for same length of overlapping PUCCH slots/sub-slots for two PUCCH
dynamicPUCCH-CellSwitchSameLengthTwoGroups-r17 SEQUENCE (SIZE (1..maxTwoPUCCH-Grp-ConfigList-r17)) OF TwoPUCCH-Grp-Configurations-r17
                                                                                              OPTIONAL,
-- R1 25-10c: PUCCH cell switching based on dynamic indication for different length of overlapping PUCCH slots/sub-slots for two
-- PUCCH groups
dynamicPUCCH-CellSwitchDiffLengthTwoGroups-r17 SEOUENCE (SIZE (1...maxTwoPUCCH-Grp-ConfigList-r17)) OF TwoPUCCH-Grp-Configurations-r17
                                                                                              OPTIONAL.
-- R1 33-2a: ACK/NACK based HARO-ACK feedback and RRC-based enabling/disabling ACK/NACK-based
-- feedback for dynamic scheduling for multicast
ack-NACK-FeedbackForMulticast-r17
                                                ENUMERATED {supported}
                                                                                              OPTIONAL,
-- R1 33-2d: PTP retransmission for multicast dynamic scheduling
                                                ENUMERATED {supported}
ptp-Retx-Multicast-r17
                                                                                              OPTIONAL,
-- R1 33-4: NACK-only based HARQ-ACK feedback for multicast with ACK/NACK transforming
nack-OnlyFeedbackForMulticast-r17
                                                ENUMERATED {supported}
                                                                                              OPTIONAL,
-- R1 33-4a: NACK-only based HARQ-ACK feedback for multicast corresponding to a specific sequence or a PUCCH transmission
nack-OnlyFeedbackSpecificResourceForMulticast-r17 ENUMERATED {supported}
                                                                                              OPTIONAL,
-- R1 33-5-1a: ACK/NACK based HARO-ACK feedback and RRC-based enabling/disabling ACK/NACK-based feedback
-- for SPS group-common PDSCH for multicast
ack-NACK-FeedbackForSPS-Multicast-r17
                                                ENUMERATED {supported}
                                                                                              OPTIONAL,
-- R1 33-5-1d: PTP retransmission for SPS group-common PDSCH for multicast
ptp-Retx-SPS-Multicast-r17
                                                ENUMERATED {supported}
                                                                                              OPTIONAL,
-- R4 26-1: Higher Power Limit CA DC
                                                 ENUMERATED {supported}
higherPowerLimit-r17
                                                                                              OPTIONAL,
-- R1 39-4: Parallel MsqA and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiquous CA
parallelTxMsgA-SRS-PUCCH-PUSCH-intraBand-r17
                                                ENUMERATED {supported}
                                                                                              OPTIONAL,
-- R1 24-11a: Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs per span when
-- configured with DL CA with Rel-17 PDCCH monitoring capability on all the serving cells
pdcch-MonitoringCA-r17
                                                INTEGER (4..16)
                                                                                              OPTIONAL,
-- R1 24-11f: Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs for MCG and for SCG
-- when configured for NR-DC operation with Rel-17 PDCCH monitoring capability on all the serving cells
pdcch-BlindDetectionMCG-SCG-List-r17
                                                SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMCG-SCG-r17
                                                                                              OPTIONAL,
-- R1 24-11c: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 17 and Rel. 15 PDCCH monitoring capabilities on
-- different Carriers
-- R1 24-11g: Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 17 and
-- Rel. 15 PDCCH monitoring capabilities on different carriers
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SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMixed-r17
    pdcch-BlindDetectionMixedList1-r17
    -- R1 24-11d: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 17 and Rel. 16 PDCCH monitoring capabilities on
    -- different Carriers
    -- R1 24-11h: Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 17 and
    -- Rel. 16 PDCCH monitoring capabilities on different carriers
    pdcch-BlindDetectionMixedList2-r17
                                                    SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMixed-r17
                                                                                                 OPTIONAL,
    -- R1 24-11e: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 17, Rel. 16 and Rel. 15 PDCCH monitoring
    -- capabilities on different carriers
    -- R1 24-11i: Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 17,
    -- Rel. 16 and Rel. 15 PDCCH monitoring capabilities on different carriers
    pdcch-BlindDetectionMixedList3-r17
                                           SEQUENCE(SIZE(1...maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMixed1-r17
                                                                                                 OPTIONAL
CA-ParametersNR-v1730 ::= SEQUENCE {
    -- R1 30-4a: DM-RS bundling for PUSCH repetition type A (per BC)
    dmrs-BundlingPUSCH-RepTypeAPerBC-r17
                                                          ENUMERATED {supported}
                                                                                                         OPTIONAL,
    -- R1 30-4b: DM-RS bundling for PUSCH repetition type B(per BC)
    dmrs-BundlingPUSCH-RepTypeBPerBC-r17
                                                          ENUMERATED {supported}
                                                                                                         OPTIONAL,
    -- R1 30-4c: DM-RS bundling for TB processing over multi-slot PUSCH(per BC)
    dmrs-BundlingPUSCH-multiSlotPerBC-r17
                                                          ENUMERATED {supported}
                                                                                                         OPTIONAL,
    -- R1 30-4d: DMRS bundling for PUCCH repetitions(per BC)
    dmrs-BundlingPUCCH-RepPerBC-r17
                                                          ENUMERATED {supported}
                                                                                                         OPTIONAL,
    -- R1 30-4q: Restart DM-RS bundling (per BC)
    dmrs-BundlingRestartPerBC-r17
                                                          ENUMERATED {supported}
                                                                                                         OPTIONAL,
    -- R1 30-4h: DM-RS bundling for non-back-to-back transmission (per BC)
    dmrs-BundlingNonBackToBackTX-PerBC-r17
                                                          ENUMERATED {supported}
                                                                                                         OPTIONAL,
    -- R1 39-3-1: Stay on the target CC for SRS carrier switching
    stayOnTargetCC-SRS-CarrierSwitch-r17
                                                          ENUMERATED {supported}
                                                                                                         OPTIONAL.
    -- R1 33-3-3a: FDM-ed Type-1 and Type-2 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast
    fdm-CodebookForMux-UnicastMulticastHARQ-ACK-r17
                                                          ENUMERATED {supported}
                                                                                                         OPTIONAL,
    -- R1 33-3-3b: Mode 2 TDM-ed Type-1 and Type-2 HARQ-ACK codebook for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast
    mode2-TDM-CodebookForMux-UnicastMulticastHARO-ACK-r17 ENUMERATED {supported}
                                                                                                         OPTIONAL,
    -- R1 33-3-4: Mode 1 for type1 codebook generation
    model-ForTypel-CodebookGeneration-r17
                                                          ENUMERATED {supported}
                                                                                                         OPTIONAL,
    -- R1 33-5-1j: NACK-only based HARO-ACK feedback for multicast corresponding to a specific sequence or a PUCCH transmission
    -- for SPS group-commmon PDSCH for multicast
    nack-OnlyFeedbackSpecificResourceForSPS-Multicast-r17 ENUMERATED {supported}
                                                                                                         OPTIONAL,
    -- R1 33-8-2: Up to 2 PUCCH resources configuration for multicast feedback for dynamically scheduled multicast
                                                          ENUMERATED {supported}
    multiPUCCH-ConfigForMulticast-r17
                                                                                                         OPTIONAL,
    -- R1 33-8-3: PUCCH resource configuration for multicast feedback for SPS GC-PDSCH
    pucch-ConfigForSPS-Multicast-r17
                                                          ENUMERATED {supported}
                                                                                                         OPTIONAL.
    -- The following parameter is associated with R1 33-2a, R1 33-3-3a, and R1 33-3-3b, and is not a RAN1 FG.
    maxNumberG-RNTI-HARQ-ACK-Codebook-r17
                                                          INTEGER (1..4)
                                                                                                         OPTIONAL,
    -- R1 33-3-5: Feedback multiplexing for unicast PDSCH and group-common PDSCH for multicast with same priority and different codebook
    mux-HARQ-ACK-UnicastMulticast-r17
                                                          ENUMERATED {supported}
                                                                                                         OPTIONAL
CrossCarrierSchedulingSCell-SpCell-r17 ::= SEQUENCE {
    supportedSCS-Combinations-r17
                                                  ENUMERATED {supported}
       scs15kHz-15kHz-r17
                                                                                                 OPTIONAL,
```

```
scs15kHz-30kHz-r17
                                                    ENUMERATED {supported}
                                                                                                    OPTIONAL,
        scs15kHz-60kHz-r17
                                                    ENUMERATED {supported}
                                                                                                    OPTIONAL,
        scs30kHz-30kHz-r17
                                                    BIT STRING (SIZE (1..496))
                                                                                                    OPTIONAL.
        scs30kHz-60kHz-r17
                                                    BIT STRING (SIZE (1..496))
                                                                                                    OPTIONAL,
        scs60kHz-60kHz-r17
                                                    BIT STRING (SIZE (1..496))
                                                                                                    OPTIONAL
    pdcch-MonitoringOccasion-r17
                                                ENUMERATED {val1, val2}
PDCCH-BlindDetectionMixedList-r16::=
                                            SEQUENCE {
    pdcch-BlindDetectionCA-MixedExt-r16
                                                CHOICE
        pdcch-BlindDetectionCA-Mixed-v16a0
                                                           PDCCH-BlindDetectionCA-MixedExt-r16,
        pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-v16a0 PDCCH-BlindDetectionCA-MixedExt-r16
                                                                                                    OPTIONAL,
    pdcch-BlindDetectionCG-UE-MixedExt-r16
                                                SEQUENCE {
    pdcch-BlindDetectionMCG-UE-Mixed-v16a0
                                                           PDCCH-BlindDetectionCG-UE-MixedExt-r16,
        pdcch-BlindDetectionSCG-UE-Mixed-v16a0
                                                           PDCCH-BlindDetectionCG-UE-MixedExt-r16
                                                                                                    OPTIONAL
PDCCH-BlindDetectionCA-MixedExt-r16 ::=
                                            SEQUENCE {
    pdcch-BlindDetectionCA1-r16
                                                INTEGER (1..15),
    pdcch-BlindDetectionCA2-r16
                                                INTEGER (1..15)
PDCCH-BlindDetectionCG-UE-MixedExt-r16 ::= SEQUENCE {
                                                INTEGER (0..15),
    pdcch-BlindDetectionCG-UE1-r16
                                                INTEGER (0..15)
    pdcch-BlindDetectionCG-UE2-r16
PDCCH-BlindDetectionMCG-SCG-r17 ::=
                                            SEQUENCE {
    pdcch-BlindDetectionMCG-UE-r17
                                                INTEGER (1..15),
    pdcch-BlindDetectionSCG-UE-r17
                                                INTEGER (1..15)
PDCCH-BlindDetectionMixed-r17::=
                                            SEQUENCE {
    pdcch-BlindDetectionCA-Mixed-r17
                                                PDCCH-BlindDetectionCA-Mixed-r17
                                                                                                    OPTIONAL,
    pdcch-BlindDetectionCG-UE-Mixed-r17
                                                SEOUENCE {
        pdcch-BlindDetectionMCG-UE-Mixed-v17
                                                    PDCCH-BlindDetectionCG-UE-Mixed-r17,
        pdcch-BlindDetectionSCG-UE-Mixed-v17
                                                    PDCCH-BlindDetectionCG-UE-Mixed-r17
                                                                                                    OPTIONAL
PDCCH-BlindDetectionCG-UE-Mixed-r17 ::=
                                            SEQUENCE {
    pdcch-BlindDetectionCG-UE1-r17
                                                INTEGER (0..15),
    pdcch-BlindDetectionCG-UE2-r17
                                                INTEGER (0..15)
PDCCH-BlindDetectionCA-Mixed-r17 ::=
                                            SEQUENCE {
    pdcch-BlindDetectionCA1-r17
                                                INTEGER (1..15)
                                                                                                    OPTIONAL,
    pdcch-BlindDetectionCA2-r17
                                                INTEGER (1..15)
                                                                                                    OPTIONAL
PDCCH-BlindDetectionMixed1-r17::=
                                            SEQUENCE {
    pdcch-BlindDetectionCA-Mixed1-r17
                                                PDCCH-BlindDetectionCA-Mixed1-r17
                                                                                                    OPTIONAL,
```

```
pdcch-BlindDetectionCG-UE-Mixed1-r17
                                                SEOUENCE {
        pdcch-BlindDetectionMCG-UE-Mixed1-v17
                                                    PDCCH-BlindDetectionCG-UE-Mixed1-r17,
        pdcch-BlindDetectionSCG-UE-Mixed1-v17
                                                    PDCCH-BlindDetectionCG-UE-Mixed1-r17
                                                                                                    OPTIONAL
PDCCH-BlindDetectionCG-UE-Mixed1-r17 ::=
                                            SEOUENCE {
    pdcch-BlindDetectionCG-UE1-r17
                                                INTEGER (0..15),
    pdcch-BlindDetectionCG-UE2-r17
                                               INTEGER (0..15),
    pdcch-BlindDetectionCG-UE3-r17
                                               INTEGER (0..15)
PDCCH-BlindDetectionCA-Mixed1-r17 ::=
                                            SEOUENCE {
    pdcch-BlindDetectionCA1-r17
                                               INTEGER (1..15)
                                                                                                    OPTIONAL,
    pdcch-BlindDetectionCA2-r17
                                               INTEGER (1..15)
                                                                                                    OPTIONAL,
    pdcch-BlindDetectionCA3-r17
                                               INTEGER (1..15)
                                                                                                    OPTIONAL
SimulSRS-ForAntennaSwitching-r16 ::= SEOUENCE {
    supportSRS-xTyR-xLessThanY-r16
                                         ENUMERATED {supported}
                                                                                      OPTIONAL,
    supportSRS-xTyR-xEqualToY-r16
                                         ENUMERATED {supported}
                                                                                      OPTIONAL.
                                         ENUMERATED {supported}
    supportSRS-AntennaSwitching-r16
                                                                                      OPTIONAL
TwoPUCCH-Grp-Configurations-r16 ::= SEQUENCE {
    pucch-PrimaryGroupMapping-r16
                                          TwoPUCCH-Grp-ConfigParams-r16,
    pucch-SecondaryGroupMapping-r16
                                         TwoPUCCH-Grp-ConfigParams-r16
TwoPUCCH-Grp-Configurations-r17 ::= SEQUENCE {
    primaryPUCCH-GroupConfig-r17
                                         PUCCH-Group-Config-r17,
    secondaryPUCCH-GroupConfig-r17
                                         PUCCH-Group-Config-r17
TwoPUCCH-Grp-ConfigParams-r16 ::=
                                     SEOUENCE {
    pucch-GroupMapping-r16
                                         PUCCH-Grp-CarrierTypes-r16,
    pucch-TX-r16
                                         PUCCH-Grp-CarrierTypes-r16
CarrierTypePair-r16 ::=
                                     SEOUENCE {
    carrierForCSI-Measurement-r16
                                         PUCCH-Grp-CarrierTypes-r16,
    carrierForCSI-Reporting-r16
                                        PUCCH-Grp-CarrierTypes-r16
PUCCH-Grp-CarrierTypes-r16 ::=
                                     SEQUENCE {
    fr1-NonSharedTDD-r16
                                         ENUMERATED {supported}
                                                                                      OPTIONAL.
    fr1-SharedTDD-r16
                                         ENUMERATED
                                                     {supported}
                                                                                      OPTIONAL,
    fr1-NonSharedFDD-r16
                                         ENUMERATED
                                                     {supported}
                                                                                      OPTIONAL,
    fr2-r16
                                         ENUMERATED {supported}
                                                                                      OPTIONAL
PUCCH-Group-Config-r17 ::=
                                     SEQUENCE {
    fr1-FR1-NonSharedTDD-r17
                                         ENUMERATED {supported}
                                                                                      OPTIONAL,
```

```
fr2-FR2-NonSharedTDD-r17 ENUMERATED {supported} OPTIONAL, fr1-FR2-NonSharedTDD-r17 ENUMERATED {supported} OPTIONAL }

- TAG-CA-PARAMETERSNR-STOP - ASN1STOP
```

CA-ParametersNR field description

codebookParametersPerBC

For a given supported band combination, this field indicates the alternative list of SupportedCSI-RS-Resource supported for each codebook type, amongst the supported CSI-RS resources included in codebookParametersPerBand in MIMO-ParametersPerBand.

CA-ParametersNRDC

The IE CA-ParametersNRDC contains dual connectivity related capabilities that are defined per band combination.

CA-ParametersNRDC information element

```
-- ASN1START
-- TAG-CA-PARAMETERS-NRDC-START
CA-ParametersNRDC ::=
                                              SEOUENCE {
                                                 CA-ParametersNR
                                                                                               OPTIONAL,
    ca-ParametersNR-ForDC
    ca-ParametersNR-ForDC-v1540
                                                 CA-ParametersNR-v1540
                                                                                               OPTIONAL,
     ca-ParametersNR-ForDC-v1550
                                                 CA-ParametersNR-v1550
                                                                                               OPTIONAL,
    ca-ParametersNR-ForDC-v1560
                                                 CA-ParametersNR-v1560
                                                                                               OPTIONAL,
     featureSetCombinationDC
                                                 FeatureSetCombinationId
                                                                                               OPTIONAL
CA-ParametersNRDC-v15q0 ::=
                                             SEOUENCE {
    ca-ParametersNR-ForDC-v15q0
                                                  CA-ParametersNR-v15q0
                                                                                                OPTIONAL
CA-ParametersNRDC-v1610 ::= SEQUENCE {
    -- R1 18-1: Semi-static power sharing model between MCG and SCG cells of same FR for NR dual connectivity
   intraFR-NR-DC-PwrSharingMode1-r16
                                             ENUMERATED {supported}
                                                                            OPTIONAL,
    -- R1 18-1a: Semi-static power sharing mode 2 between MCG and SCG cells of same FR for NR dual connectivity
    intraFR-NR-DC-PwrSharingMode2-r16
                                             ENUMERATED {supported}
                                                                            OPTIONAL,
    -- R1 18-1b: Dynamic power sharing between MCG and SCG cells of same FR for NR dual connectivity
    intraFR-NR-DC-DynamicPwrSharing-r16
                                             ENUMERATED {short, long}
                                                                            OPTIONAL,
                                             ENUMERATED {supported}
    asyncNRDC-r16
                                                                             OPTIONAL
CA-ParametersNRDC-v1630 ::=
                                                    SEQUENCE {
    ca-ParametersNR-ForDC-v1610
                                                 CA-ParametersNR-v1610
                                                                                               OPTIONAL,
                                                 CA-ParametersNR-v1630
    ca-ParametersNR-ForDC-v1630
                                                                                               OPTIONAL
CA-ParametersNRDC-v1640 ::=
                                             SEQUENCE {
```

```
ca-ParametersNR-ForDC-v1640
                                                 CA-ParametersNR-v1640
                                                                                               OPTIONAL
CA-ParametersNRDC-v1650 ::=
                                             SEOUENCE {
    supportedCellGrouping-r16
                                                 BIT STRING (SIZE (1..maxCellGroupings-r16)) OPTIONAL
CA-ParametersNRDC-v16a0 ::=
                                             SEOUENCE {
    ca-ParametersNR-ForDC-v16a0
                                                 CA-ParametersNR-v16a0
                                                                                               OPTIONAL
CA-ParametersNRDC-v1700 ::=
                                              SEQUENCE {
    -- R1 31-9: Indicates the support of simultaneous transmission and reception of an IAB-node from multiple parent nodes
    simultaneousRxTx-IAB-MultipleParents-r17
                                                 ENUMERATED {supported}
                                                                                               OPTIONAL,
    condPSCellAdditionNRDC-r17
                                                 ENUMERATED
                                                             {supported}
                                                                                               OPTIONAL,
    scg-ActivationDeactivationNRDC-r17
                                                 ENUMERATED {supported}
                                                                                               OPTIONAL,
    scg-ActivationDeactivationResumeNRDC-r17
                                                 ENUMERATED {supported}
                                                                                               OPTIONAL,
                                                 ENUMERATED {supported}
    beamManagementType-CBM-r17
                                                                                               OPTIONAL
CA-ParametersNRDC-v1720 ::=
                                             SEQUENCE {
                                                 CA-ParametersNR-v1700
    ca-ParametersNR-ForDC-v1700
                                                                                               OPTIONAL,
    ca-ParametersNR-ForDC-v1720
                                                 CA-ParametersNR-v1720
                                                                                               OPTIONAL
CA-ParametersNRDC-v1730 ::=
                                             SEOUENCE {
    ca-ParametersNR-ForDC-v1730
                                                  CA-ParametersNR-v1730
                                                                                                OPTIONAL
-- TAG-CA-PARAMETERS-NRDC-STOP
-- ASN1STOP
```

CA-ParametersNRDC field descriptions

ca-ParametersNR-forDC (with and without suffix)

If this field is present for a band combination, it reports the UE capabilities when NR-DC is configured with the band combination. If a version of this field (i.e., with or without suffix) is absent for a band combination, the corresponding *ca-ParametersNR* field version in *BandCombination* is applicable to the UE configured with NR-DC for the band combination. If a version of this field (i.e., with or without suffix) is present for a band combination but does not contain any parameters, the UE does not support the corresponding field version when configured with NR-DC for the band combination.

featureSetCombinationDC

If this field is present for a band combination, it reports the feature set combination supported for the band combination when NR-DC is configured. If this field is absent for a band combination, the *featureSetCombination* in *BandCombination* (without suffix) is applicable to the UE configured with NR-DC for the band combination.

CarrierAggregationVariant

The IE CarrierAggregationVariant informs the network about supported "placement" of the SpCell in an NR cell group.

Carrier Aggregation Variant information element

```
-- ASN1START
-- TAG-CARRIERAGGREGATIONVARIANT-START
CarrierAggregationVariant ::=
    fr1fdd-FR1TDD-CA-SpCellOnFR1FDD
                                            ENUMERATED {supported}
                                                                                         OPTIONAL,
    fr1fdd-FR1TDD-CA-SpCellOnFR1TDD
                                            ENUMERATED {supported}
                                                                                         OPTIONAL,
    fr1fdd-FR2TDD-CA-SpCellOnFR1FDD
                                            ENUMERATED {supported}
                                                                                         OPTIONAL,
    fr1fdd-FR2TDD-CA-SpCellOnFR2TDD
                                            ENUMERATED {supported}
                                                                                         OPTIONAL,
    fr1tdd-FR2TDD-CA-SpCellOnFR1TDD
                                            ENUMERATED {supported}
                                                                                         OPTIONAL,
    fr1tdd-FR2TDD-CA-SpCellOnFR2TDD
                                            ENUMERATED {supported}
                                                                                         OPTIONAL,
    fr1fdd-FR1TDD-FR2TDD-CA-SpCellOnFR1FDD ENUMERATED {supported}
                                                                                         OPTIONAL,
    fr1fdd-FR1TDD-FR2TDD-CA-SpCellOnFR1TDD ENUMERATED {supported}
                                                                                         OPTIONAL,
    fr1fdd-FR1TDD-FR2TDD-CA-SpCellOnFR2TDD ENUMERATED {supported}
                                                                                         OPTIONAL
-- TAG-CARRIERAGGREGATIONVARIANT-STOP
-- ASN1STOP
```

CodebookParameters

The IE CodebookParameters is used to convey codebook related parameters.

CodebookParameters information element

```
-- ASN1START
-- TAG-CODEBOOKPARAMETERS-START
                                   SEQUENCE {
CodebookParameters ::=
    type1
                                           SEQUENCE {
        singlePanel
                                              SEQUENCE
                                              SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource,
            supportedCSI-RS-ResourceList
           modes
                                                   ENUMERATED {mode1, mode1andMode2},
                                              INTEGER (1..8)
            maxNumberCSI-RS-PerResourceSet
        },
       multiPanel
                                              SEQUENCE {
            supportedCSI-RS-ResourceList
                                              SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource,
                                                   ENUMERATED {mode1, mode2, both},
                                                  ENUMERATED {n2, n4},
           nrofPanels
            maxNumberCSI-RS-PerResourceSet
                                              INTEGER (1..8)
                                                                                                                         OPTIONAL
                                           SEQUENCE {
    type2
        supportedCSI-RS-ResourceList
                                            SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource,
        parameterLx
                                             INTEGER (2..4),
        amplitudeScalingType
                                             ENUMERATED {wideband, widebandAndSubband},
                                            ENUMERATED {supported}
        amplitudeSubsetRestriction
                                                                                                                         OPTIONAL,
    type2-PortSelection
                                         SEOUENCE {
        supportedCSI-RS-ResourceList
                                            SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource,
```

```
parameterLx
                                              INTEGER (2..4),
       amplitudeScalingType
                                             ENUMERATED {wideband, widebandAndSubband}
                                                                                                                         OPTIONAL
CodebookParameters-v1610 ::=
                                    SEOUENCE {
    supportedCSI-RS-ResourceListAlt-r16 SEQUENCE {
        type1-SinglePanel-r16
                                             SEQUENCE (SIZE (1..maxNrofCSI-RS-Resources)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
OPTIONAL,
        type1-MultiPanel-r16
                                             SEQUENCE (SIZE (1..maxNrofCSI-RS-Resources)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
OPTIONAL,
        type2-r16
                                             SEQUENCE (SIZE (1..maxNrofCSI-RS-Resources)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
OPTIONAL.
        type2-PortSelection-r16
                                             SEQUENCE (SIZE (1..maxNrofCSI-RS-Resources)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
OPTIONAL
OPTIONAL
CodebookParametersAddition-r16 ::=
                                        SEOUENCE {
    etype2-r16
                                           SEQUENCE {
        -- R1 16-3a Regular eType 2 R=1
                                               SEOUENCE {
        etype2R1-r16
            supportedCSI-RS-ResourceListAdd-r16
                                                  SEOUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF
                                                                                               INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
        -- R1 16-3a-1 Regular eType 2 R=2
        etype2R2-r16
                                               SEQUENCE
            supportedCSI-RS-ResourceListAdd-r16
                                                   SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF
                                                                                              INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                           OPTIONAL.
        -- R1 16-3a-2: Support of parameter combinations 7-8
        paramComb7-8-r16
                                               ENUMERATED {supported}
                                                                           OPTIONAL,
        -- R1 16-3a-3: Support of rank 3,4
       rank3-4-r16
                                               ENUMERATED {supported}
                                                                           OPTIONAL.
        -- R1 16-3a-4: CBSR with soft amplitude restriction
        amplitudeSubsetRestriction-r16
                                               ENUMERATED {supported}
                                                                           OPTIONAL
                                                                           OPTIONAL,
    etype2-PS-r16
                                           SEQUENCE {
        -- R1 16-3b Regular eType 2 R=1 PortSelection
        etype2R1-PortSelection-r16
                                               SEOUENCE
            supportedCSI-RS-ResourceListAdd-r16
                                                  SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF
                                                                                              INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
        },
        -- R1 16-3b-1 Regular eType 2 R=2 PortSelection
        etype2R2-PortSelection-r16
                                               SEOUENCE
            supportedCSI-RS-ResourceListAdd-r16
                                                   SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF
                                                                                               INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                           OPTIONAL.
        -- R1 16-3b-2: Support of rank 3,4
                                               ENUMERATED {supported}
        rank3-4-r16
                                                                           OPTIONAL
                                                                           OPTIONAL
```

```
CodebookComboParametersAddition-r16 ::= SEOUENCE {
    -- R1 16-8 Mixed codebook types
    type1SP-Type2-null-r16
                                           SEQUENCE .
        supportedCSI-RS-ResourceListAdd-r16
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    type1SP-Type2PS-null-r16
                                           SEOUENCE {
        supportedCSI-RS-ResourceListAdd-r16
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-eType2R1-null-r16
                                           SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-eType2R2-null-r16
                                           SEOUENCE {
        supportedCSI-RS-ResourceListAdd-r16
                                               SEOUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
                                           SEQUENCE {
    type1SP-eType2R1PS-null-r16
        supportedCSI-RS-ResourceListAdd-r16
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-eType2R2PS-null-r16
                                           SEOUENCE {
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
        supportedCSI-RS-ResourceListAdd-r16
                                                               OPTIONAL,
    type1SP-Type2-Type2PS-r16
                                           SEOUENCE {
        supportedCSI-RS-ResourceListAdd-r16
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-Type2-null-r16
                                           SEOUENCE {
    supportedCSI-RS-ResourceListAdd-r16
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
                                           SEQUENCE {
    type1MP-Type2PS-null-r16
        supportedCSI-RS-ResourceListAdd-r16
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-eType2R1-null-r16
                                           SEOUENCE {
        supportedCSI-RS-ResourceListAdd-r16
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-eType2R2-null-r16
                                           SEOUENCE {
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
        supportedCSI-RS-ResourceListAdd-r16
                                                               OPTIONAL,
    type1MP-eType2R1PS-null-r16
                                           SEOUENCE {
        supportedCSI-RS-ResourceListAdd-r16
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-eType2R2PS-null-r16
                                           SEOUENCE {
        supportedCSI-RS-ResourceListAdd-r16
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-Type2-Type2PS-r16
                                           SEOUENCE {
        supportedCSI-RS-ResourceListAdd-r16
                                               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL
CodebookParametersfetype2-r17 ::= SEOUENCE {
    -- R1 23-9-1 Basic Features of Further Enhanced Port-Selection Type II Codebook (FeType-II)
    fetype2basic-r17
                            SEQUENCE (SIZE (1.. maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16),
    -- R1 23-9-2 Support of M=2 and R=1 for FeType-II
    fetype2R1-r17
                           SEQUENCE (SIZE (1...maxNrofCSI-RS-ResourcesExt-r17)) OF INTEGER (0.. maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                       OPTIONAL,
    -- R1 23-9-4 Support of R = 2 for FeType-II
    fetype2R2-r17
                            SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r17)) OF INTEGER (0.. maxNrofCSI-RS-ResourcesAlt-1-r16)
```

```
OPTIONAL,
    -- R1 23-9-3 Support of rank 3, 4 for FeType-II
    OPTIONAL
CodebookComboParameterMixedType-r17 ::= SEOUENCE {
    -- R1 23-9-5 Active CSI-RS resources and ports for mixed codebook types in any slot
    type1SP-feType2PS-null-r17
                                           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-feType2PS-M2R1-null-r17
                                           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                              OPTIONAL,
    type1SP-feType2PS-M2R2-null-r1
                                           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-Type2-feType2-PS-M1-r17
                                           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    type1SP-Type2-feType2-PS-M2R1-r17
                                           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
                                           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    type1SP-eType2R1-feType2-PS-M1-r17
    type1SP-eType2R1-feType2-PS-M2R1-r17
                                            SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-feType2PS-null-r17
                                            SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-feType2PS-M2R1-null-r17
                                           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                              OPTIONAL,
    type1MP-feType2PS-M2R2-null-r17
                                           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-Type2-feType2-PS-M1-r17
                                           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    type1MP-Type2-feType2-PS-M2R1-r17
                                           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-eType2R1-feType2-PS-M1-r17
                                           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-eType2R1-feType2-PS-M2R1-r17
                                           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
CodebookComboParameterMultiTRP-r17::= SEOUENCE {
    -- R1 23-7-1b Active CSI-RS resources and ports in the presence of multi-TRP CSI
    -- {Codebook 2, Codebook 3} = (NULL, NULL)
    nCJT-null-null
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-null-null
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
          \{Codebook\ 2,\ Codebook\ 3\} = \{(\{ "Rel\ 16\ combinations\ in\ FG\ 16-8"\}\}\}
    nCJT-Type2-null-r16
                                         SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    nCJT-Type2PS-null-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-eType2R1-null-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-eType2R2-null-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-eType2R1PS-null-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
```

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OPTIONAL,
    nCJT-eType2R2PS-null-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    nCJT-Type2-Type2PS-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    nCJT1SP-Type2-null-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-Type2PS-null-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-eType2R1-null-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-eType2R2-null-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-eType2R1PS-null-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    nCJT1SP-eType2R2PS-null-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-Type2-Type2PS-r16
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    -- {Codebook 2, Codebook 3} = {"New Rel17 combinations in FG 23-9-5"}
    nCJT-feType2PS-null-r17
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    nCJT-feType2PS-M2R1-null-r17
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-feType2PS-M2R2-null-r17
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    nCJT-Type2-feType2-PS-M1-r17
                                          SEQUENCE (SIZE (1...maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-Type2-feType2-PS-M2R1-r17
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-eType2R1-feType2-PS-M1-r17
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-eType2R1-feType2-PS-M2R1-r17
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-feType2PS-null-r17
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-feType2PS-M2R1-null-r17
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-feType2PS-M2R2-null-r1
                                          SEQUENCE (SIZE (1...maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    nCJT1SP-Type2-feType2-PS-M1-r17
                                                               OPTIONAL,
    nCJT1SP-Type2-feType2-PS-M2R1-r17
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-eTvpe2R1-feTvpe2-PS-M1-r17
                                          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    nCJT1SP-eType2R1-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL
CodebookParametersAdditionPerBC-r16::= SEQUENCE {
    -- R1 16-3a Regular eType 2 R=1
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    etype2R1-r16
                                                               OPTIONAL,
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-- R1 16-3a-1 Regular eType 2 R=2
    et.vpe2R2-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                      OPTIONAL.
    -- R1 16-3b Regular eType 2 R=1 PortSelection
    etype2R1-PortSelection-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    -- R1 16-3b-1 Regular eType 2 R=2 PortSelection
    etvpe2R2-PortSelection-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
CodebookComboParametersAdditionPerBC-r16::= SEOUENCE {
    -- R1 16-8 Mixed codebook types
    type1SP-Type2-null-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    type1SP-Type2PS-null-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-eType2R1-null-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-eType2R2-null-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-eType2R1PS-null-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-eType2R2PS-null-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-Type2-Type2PS-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                OPTIONAL,
    type1MP-Type2-null-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-Type2PS-null-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    type1MP-eType2R1-null-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    type1MP-eType2R2-null-r16
                                                               OPTIONAL,
    type1MP-eType2R1PS-null-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-eType2R2PS-null-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-Type2-Type2PS-r16
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL
CodebookParametersfetype2PerBC-r17 ::= SEQUENCE {
                    Basic Features of Further Enhanced Port-Selection Type II Codebook (FeType-II)
    -- R1 23-9-1
    fetype2basic-r17
                        SEQUENCE (SIZE (1.. maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16),
    -- R1 23-9-2
                    Support of M=2 and R=1 for FeType-II
    fetype2R1-r17
                        SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r17)) OF INTEGER (0.. maxNrofCSI-RS-ResourcesAlt-1-r16)
                                  OPTIONAL,
    -- R1 23-9-4
                    Support of R = 2 for FeType-II
    fetype2R2-r17
                        SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r17)) OF INTEGER (0.. maxNrofCSI-RS-ResourcesAlt-1-r16)
                                  OPTIONAL
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CodebookComboParameterMixedTypePerBC-r17 ::= SEOUENCE {
    -- R1 23-9-5 Active CSI-RS resources and ports for mixed codebook types in any slot
    tvpe1SP-feTvpe2PS-null-r17
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-feType2PS-M2R1-null-r17 SEOUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-feType2PS-M2R2-null-r17 SEOUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                              OPTIONAL,
    type1SP-Type2-feType2-PS-M1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    type1SP-Type2-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-eType2R1-feType2-PS-M1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1SP-eType2R1-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-feType2PS-null-r17
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-feType2PS-M2R1-null-r17 SEOUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    type1MP-feType2PS-M2R2-null-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-Type2-feType2-PS-M1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-Type2-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-eType2R1-feType2-PS-M1-r17 SEOUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    type1MP-eType2R1-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL
CodebookComboParameterMultiTRP-PerBC-r17::= SEQUENCE {
    -- R1 23-7-1b Active CSI-RS resources and ports in the presence of multi-TRP CSI
    -- {Codebook 2, Codebook 3} = (NULL, NULL}
    nCJT-null-null
                                SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-null-null
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
          {Codebook 2, Codebook 3} = {( {"Rel 16 combinations in FG 16-8"}
    nCJT-Type2-null-r16
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-Type2PS-null-r16
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-eType2R1-null-r16
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    nCJT-eTvpe2R2-null-r16
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-eType2R1PS-null-r16
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    nCJT-eType2R2PS-null-r16
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-Type2-Type2PS-r16
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
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nCJT1SP-Type2-null-r16
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    nCJT1SP-Type2PS-null-r16
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    nCJT1SP-eType2R1-null-r16
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-eType2R2-null-r16
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-eType2R1PS-null-r16
                                SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
                                SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    nCJT1SP-eType2R2PS-null-r16
                                                               OPTIONAL,
    nCJT1SP-Type2-Type2PS-r16
                                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL.
    -- {Codebook 2, Codebook 3} = {"New Rel17 combinations in FG 23-9-5"}
    nCJT-feType2PS-null-r17
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-feType2PS-M2R1-null-r17
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-feType2PS-M2R2-null-r17
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-Type2-feType2-PS-M1-r17
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-Type2-feType2-PS-M2R1-r17 SEOUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-eType2R1-feType2-PS-M1-r17 SEOUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT-eType2R1-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-feType2PS-null-r17
                                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-feType2PS-M2R1-null-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-feType2PS-M2R2-null-r1 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-Type2-feType2-PS-M1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-Type2-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-eType2R1-feType2-PS-M1-r17 SEOUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL,
    nCJT1SP-eType2R1-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                               OPTIONAL
CodebookVariantsList-r16 ::= SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesAlt-r16)) OF SupportedCSI-RS-Resource
SupportedCSI-RS-Resource ::=
                                 SEOUENCE {
    maxNumberTxPortsPerResource
                                     ENUMERATED {p2, p4, p8, p12, p16, p24, p32},
    maxNumberResourcesPerBand
                                     INTEGER (1..64),
    totalNumberTxPortsPerBand
                                     INTEGER (2..256)
-- TAG-CODEBOOKPARAMETERS-STOP
```

-- ASN1STOP

CodebookParameters field descriptions

supportedCSI-RS-ResourceListAlt

This field indicates the alternative list of SupportedCSI-RS-Resource supported for each codebook type. The supported CSI-RS resource is indicated by an integer value which pinpoints SupportedCSI-RS-Resource defined in CodebookVariantsList. The value 0 corresponds to the first entry of CodebookVariantsList. The value 1 corresponds to the second entry of CodebookVariantsList, and so on. For each codebook type, the field shall be included in both codebookParametersPerBC (but optional for single CC) and codebookParametersPerBand.

FeatureSetCombination

The IE FeatureSetCombination is a two-dimensional matrix of FeatureSet entries.

Each FeatureSetsPerBand contains a list of feature sets applicable to the carrier(s) of one band entry of the associated band combination. Across the associated bands, the UE shall support the combination of FeatureSets at the same position in the FeatureSetsPerBand. All FeatureSetsPerBand in one FeatureSetCombination must have the same number of entries.

The number of FeatureSetsPerBand in the FeatureSetCombination must be equal to the number of band entries in an associated band combination. The first FeatureSetPerBand applies to the first band entry of the band combination, and so on.

Each FeatureSet contains either a pair of NR or E-UTRA feature set IDs for UL and DL.

In case of NR, the actual feature sets for UL and DL are defined in the *FeatureSets* IE and referred to from here by their ID, i.e., their position in the *featureSetsUplink* / *featureSetsDownlink* list in the FeatureSet IE.

In case of E-UTRA, the feature sets referred to from this list are defined in TS 36.331 [10] and conveyed as part of the UE-EUTRA-Capability container.

The FeatureSetUplink and FeatureSetDownlink referred to from the FeatureSet comprise, among other information, a set of FeatureSetUplinkPerCC-Ids and FeatureSetDownlinkPerCC-Ids. The number of these per-CC IDs determines the number of carriers that the UE is able to aggregate contiguously in frequency domain in the corresponding band. The number of carriers supported by the UE is also restricted by the bandwidth class indicated in the associated BandCombination, if present.

In feature set combinations the UE shall exclude entries with same or lower capabilities, since the network may anyway assume that the UE supports those.

- NOTE 1: The UE may advertise fallback band-combinations in which it supports additional functionality explicitly in two ways: Either by setting FeatureSet IDs to zero (inter-band and intra-band non-contiguous fallback) and by reducing the number of FeatureSet-PerCC Ids in a Feature Set (intra-band contiguous fallback). Or by separate *BandCombination* entries with associated *FeatureSetCombinations*.
- NOTE 2: The UE may advertise a *FeatureSetCombination* containing only fallback band combinations. That means, in a *FeatureSetCombination*, each group of *FeatureSets* across the bands may contain at least one pair of *FeatureSetUplinkId* and *FeatureSetDownlinkId* which is set to 0/0.
- NOTE 3: The Network configures serving cell(s) and BWP(s) configuration to comply with capabilities derived from the combination of FeatureSets at the same position in the FeatureSetsPerBand, regardless of activated/deactivated serving cell(s) and BWP(s).

FeatureSetCombination information element

```
-- ASN1START
-- TAG-FEATURESETCOMBINATION-START
                               SEQUENCE (SIZE (1..maxSimultaneousBands)) OF FeatureSetsPerBand
FeatureSetCombination ::=
FeatureSetsPerBand ::=
                               SEQUENCE (SIZE (1..maxFeatureSetsPerBand)) OF FeatureSet
FeatureSet ::=
                               CHOICE {
                                   SEOUENCE {
    eutra
       downlinkSetEUTRA
                                       FeatureSetEUTRA-DownlinkId,
       uplinkSetEUTRA
                                       FeatureSetEUTRA-UplinkId
                                   SEOUENCE {
       downlinkSetNR
                                       FeatureSetDownlinkId,
       uplinkSetNR
                                       FeatureSetUplinkId
-- TAG-FEATURESETCOMBINATION-STOP
-- ASN1STOP
```

FeatureSetCombinationId

The IE FeatureSetCombinationId identifies a FeatureSetCombination. The FeatureSetCombinationId of a FeatureSetCombination is the position of the FeatureSetCombination in the featureSetCombinationId of a FeatureSetCombination is the position of the FeatureSetCombination in the featureSetCombination list (in UE-NR-Capability or UE-MRDC-Capability). The FeatureSetCombinationId = 0 refers to the first entry in the featureSetCombinations list (in UE-NR-Capability).

NOTE: The FeatureSetCombinationId = 1024 is not used due to the maximum entry number of featureSetCombinations.

FeatureSetCombinationId information element

```
-- ASN1START
-- TAG-FEATURESETCOMBINATIONID-START

FeatureSetCombinationId ::= INTEGER (0.. maxFeatureSetCombinations)
-- TAG-FEATURESETCOMBINATIONID-STOP
-- ASN1STOP
```

FeatureSetDownlink

The IE FeatureSetDownlink indicates a set of features that the UE supports on the carriers corresponding to one band entry in a band combination.

FeatureSetDownlink information element

```
-- ASN1START
-- TAG-FEATURESETDOWNLINK-START
FeatureSetDownlink ::=
                                         SEOUENCE {
    featureSetListPerDownlinkCC
                                             SEQUENCE (SIZE (1..maxNrofServingCells)) OF FeatureSetDownlinkPerCC-Id,
    intraBandFreqSeparationDL
                                             FreqSeparationClass
                                                                                                                       OPTIONAL.
    scalingFactor
                                             ENUMERATED {f0p4, f0p75, f0p8}
                                                                                                                       OPTIONAL,
    dummy8
                                             ENUMERATED {supported}
                                                                                                                       OPTIONAL,
    scellWithoutSSB
                                             ENUMERATED {supported}
                                                                                                                       OPTIONAL.
    csi-RS-MeasSCellWithoutSSB
                                             ENUMERATED {supported}
                                                                                                                       OPTIONAL,
    dummv1
                                             ENUMERATED {supported}
                                                                                                                       OPTIONAL,
    type1-3-CSS
                                                        {supported}
                                             ENUMERATED
                                                                                                                       OPTIONAL,
    pdcch-MonitoringAnyOccasions
                                             ENUMERATED {withoutDCI-Gap, withDCI-Gap}
                                                                                                                       OPTIONAL.
                                             ENUMERATED {supported}
                                                                                                                       OPTIONAL.
    ue-SpecificUL-DL-Assignment
                                             ENUMERATED {supported}
                                                                                                                       OPTIONAL,
    searchSpaceSharingCA-DL
                                             ENUMERATED {supported}
                                                                                                                       OPTIONAL,
    timeDurationForOCL
                                             SEOUENCE {
        scs-60kHz
                                             ENUMERATED { s7, s14, s28 }
                                                                                                                       OPTIONAL,
        scs-120kHz
                                             ENUMERATED {s14, s28}
                                                                                                                       OPTIONAL
                                                                                                                   OPTIONAL,
    pdsch-ProcessingType1-DifferentTB-PerSlot SEQUENCE {
        scs-15kHz
                                                 ENUMERATED
                                                            {upto2, upto4, upto7
                                                                                                                       OPTIONAL,
        scs-30kHz
                                                             {upto2, upto4, upto7
                                                 ENUMERATED
                                                                                                                       OPTIONAL,
        scs-60kHz
                                                 ENUMERATED
                                                             {upto2, upto4, upto7
                                                                                                                       OPTIONAL,
        scs-120kHz
                                                 ENUMERATED {upto2, upto4, upto7}
                                                                                                                       OPTIONAL
                                                                                                                   OPTIONAL,
                                                                                                                       OPTIONAL,
    dummy3
                                             DummyA
    dummv4
                                             SEOUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyB
                                                                                                                       OPTIONAL,
                                             SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyC
    dummy5
                                                                                                                       OPTIONAL,
    dummy6
                                             SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyD
                                                                                                                       OPTIONAL.
    dummy7
                                             SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyE
                                                                                                                       OPTIONAL
FeatureSetDownlink-v1540 ::= SEOUENCE {
    oneFL-DMRS-TwoAdditionalDMRS-DL
                                             ENUMERATED {supported}
                                                                                           OPTIONAL.
    additionalDMRS-DL-Alt
                                                        {supported}
                                             ENUMERATED
                                                                                           OPTIONAL,
    twoFL-DMRS-TwoAdditionalDMRS-DL
                                             ENUMERATED {supported}
                                                                                           OPTIONAL,
    oneFL-DMRS-ThreeAdditionalDMRS-DL
                                             ENUMERATED {supported}
                                                                                           OPTIONAL,
    pdcch-MonitoringAnyOccasionsWithSpanGap SEQUENCE {
        scs-15kHz
                                                 ENUMERATED {set1, set2, set3}
                                                                                                OPTIONAL,
                                                                                               OPTIONAL,
        scs-30kHz
                                                 ENUMERATED {set1, set2, set3}
        scs-60kHz
                                                 ENUMERATED {set1, set2, set3}
                                                                                                OPTIONAL,
        scs-120kHz
                                                 ENUMERATED {set1, set2, set3}
                                                                                                OPTIONAL
                                                                                           OPTIONAL,
    pdsch-SeparationWithGap
                                             ENUMERATED {supported}
                                                                                           OPTIONAL,
    pdsch-ProcessingType2
                                             SEOUENCE {
        scs-15kHz
                                                 ProcessingParameters
                                                                                                OPTIONAL,
        scs-30kHz
                                                 ProcessingParameters
                                                                                                OPTIONAL,
        scs-60kHz
                                                 ProcessingParameters
                                                                                                OPTIONAL
    } OPTIONAL,
    pdsch-ProcessingType2-Limited
                                             SEOUENCE {
```

```
differentTB-PerSlot-SCS-30kHz
                                             ENUMERATED {upto1, upto2, upto4, upto7}
   } OPTIONAL.
   dl-MCS-TableAlt-DynamicIndication
                                         ENUMERATED {supported}
                                                                                   OPTIONAL
FeatureSetDownlink-v15a0 ::= SEOUENCE {
   supportedSRS-Resources
                                                                                   OPTIONAL
                                     SRS-Resources
FeatureSetDownlink-v1610 ::= SEOUENCE {
   -- R1 22-4e/4f/4g/4h: CBG based reception for DL with unicast PDSCH(s) per slot per CC with UE processing time Capability 1
   scs-15kHz-r16
                           ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,
       scs-30kHz-r16
                           ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,
       scs-60kHz-r16
                           ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,
       scs-120kHz-r16
                           ENUMERATED {one, upto2, upto4, upto7} OPTIONAL
   } OPTIONAL,
   -- R1 22-3e/3f/3g/3h: CBG based reception for DL with unicast PDSCH(s) per slot per CC with UE processing time Capability 2
   scs-15kHz-r16
                           ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,
       scs-30kHz-r16
                           ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,
       scs-60kHz-r16
                           ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,
       scs-120kHz-r16
                           ENUMERATED {one, upto2, upto4, upto7} OPTIONAL
     OPTIONAL,
   intraFreqDAPS-r16
                                    SEQUENCE {
       intraFreqDiffSCS-DAPS-r16
                                        ENUMERATED {supported}
                                                                        OPTIONAL,
       intraFreqAsyncDAPS-r16
                                        ENUMERATED {supported}
                                                                        OPTIONAL
                                                                        OPTIONAL,
   intraBandFregSeparationDL-v1620
                                    FreqSeparationClassDL-v1620
                                                                        OPTIONAL,
   intraBandFregSeparationDL-Onlv-r16 FregSeparationClassDL-Onlv-r16
                                                                        OPTIONAL,
   -- R1 11-2: Rel-16 PDCCH monitoring capability
   pdcch-Monitoring-r16
                                    SEQUENCE {
       pdsch-ProcessingTypel-r16
                                        SEOUENCE {
           scs-15kHz-r16
                                            PDCCH-MonitoringOccasions-r16 OPTIONAL,
           scs-30kHz-r16
                                            PDCCH-MonitoringOccasions-r16 OPTIONAL
                                                                        OPTIONAL,
                                    SEOUENCE {
       pdsch-ProcessingType2-r16
           scs-15kHz-r16
                                        PDCCH-MonitoringOccasions-r16
                                                                        OPTIONAL,
           scs-30kHz-r16
                                        PDCCH-MonitoringOccasions-r16
                                                                        OPTIONAL
                                                                        OPTIONAL
                                                                        OPTIONAL,
   -- R1 11-2b: Mix of Rel. 16 PDCCH monitoring capability and Rel. 15 PDCCH monitoring capability on different carriers
   pdcch-MonitoringMixed-r16
                                    ENUMERATED {supported}
                                                                        OPTIONAL.
   -- R1 18-5c: Processing up to X unicast DCI scheduling for DL per scheduled CC
   ENUMERATED {n1,n2,n4}
       scs-15kHz-120kHz-r16
                                                                        OPTIONAL,
       scs-15kHz-60kHz-r16
                                        ENUMERATED {n1,n2,n4}
                                                                        OPTIONAL,
       scs-30kHz-120kHz-r16
                                        ENUMERATED {n1,n2,n4}
                                                                        OPTIONAL,
       scs-15kHz-30kHz-r16
                                        ENUMERATED {n2}
                                                                        OPTIONAL,
       scs-30kHz-60kHz-r16
                                        ENUMERATED {n2}
                                                                        OPTIONAL,
```

```
scs-60kHz-120kHz-r16
                                           ENUMERATED {n2}
                                                                             OPTIONAL
                                                                             OPTIONAL,
    -- R1 16-2b-1: Support of single-DCI based SDM scheme
    singleDCI-SDM-scheme-r16
                                       ENUMERATED {supported}
                                                                             OPTIONAL
FeatureSetDownlink-v1700 ::= SEOUENCE {
    -- R1 36-2: Scaling factor to be applied to 1024QAM for FR1
    scalingFactor-1024QAM-FR1-r17 ENUMERATED {f0p4, f0p75, f0p8}
                                                                             OPTIONAL,
    -- R1 24 feature for existing UE cap to include new SCS
    timeDurationForOCL-v1710
                                 SEOUENCE {
        scs-480kHz
                                     ENUMERATED {s56, s112}
                                                                             OPTIONAL,
        scs-960kHz
                                     ENUMERATED {s112, s224}
                                                                             OPTIONAL
                                                                             OPTIONAL,
    -- R1 23-6-1
                   SFN scheme A (scheme 1) for PDSCH and PDCCH
                                    ENUMERATED {supported}
    sfn-SchemeA-r17
                                                                             OPTIONAL,
    -- R1 23-6-1-1 SFN scheme A (scheme 1) for PDCCH only
    sfn-SchemeA-PDCCH-only-r17
                                    ENUMERATED {supported}
                                                                             OPTIONAL,
    -- R1 23-6-la Dynamic switching - scheme A
    sfn-SchemeA-DynamicSwitching-r17 ENUMERATED {supported}
                                                                             OPTIONAL,
    -- R1 23-6-1b SFN scheme A (scheme 1) for PDSCH only
    sfn-SchemeA-PDSCH-only-r17
                                     ENUMERATED {supported}
                                                                             OPTIONAL,
    -- R1 23-6-2 SFN scheme B (TRP based pre-compensation) for PDSCH and PDCCH
    sfn-SchemeB-r17
                                     ENUMERATED {supported}
                                                                             OPTIONAL,
    -- R1 23-6-2a Dynamic switching - scheme B
    sfn-SchemeB-DynamicSwitching-r17 ENUMERATED {supported}
                                                                             OPTIONAL,
    -- R1 23-6-2b SFN scheme B (TRP based pre-compensation) for PDSCH only
    sfn-SchemeB-PDSCH-only-r17
                                    ENUMERATED {supported}
                                                                             OPTIONAL,
    -- R1 23-2-1d PDCCH repetition for Case 2 PDCCH monitoring with a span gap
    mTRP-PDCCH-Case2-1SpanGap-r17
                                    SEOUENCE {
       scs-15kHz-r17
                                         PDCCH-RepetitionParameters-r17
                                                                             OPTIONAL,
        scs-30kHz-r17
                                         PDCCH-RepetitionParameters-r17
                                                                             OPTIONAL,
       scs-60kHz-r17
                                         PDCCH-RepetitionParameters-r17
                                                                             OPTIONAL,
        scs-120kHz-r17
                                         PDCCH-RepetitionParameters-r17
                                                                             OPTIONAL
                                                                             OPTIONAL,
    -- R1 23-2-le PDCCH repetition for Rel-16 PDCCH monitoring
    mTRP-PDCCH-legacyMonitoring-r17 SEQUENCE {
        scs-15kHz-r17
                                         PDCCH-RepetitionParameters-r17
                                                                             OPTIONAL,
        scs-30kHz-r17
                                         PDCCH-RepetitionParameters-r17
                                                                             OPTIONAL
                                                                             OPTIONAL,
    -- R1 23-2-4 Simultaneous configuration of PDCCH repetition and multi-DCI based multi-TRP
    mTRP-PDCCH-multiDCI-multiTRP-r17 ENUMERATED {supported}
                                                                             OPTIONAL,
    -- R1 33-2: Dynamic scheduling for multicast for PCell
    dynamicMulticastPCell-r17
                                     ENUMERATED {supported}
                                                                             OPTIONAL.
    -- R1 23-2-1 PDCCH repetition
    mTRP-PDCCH-Repetition-r17
                                     SEOUENCE {
       numBD-twoPDCCH-r17
                                         INTEGER (2..3),
        maxNumOverlaps-r17
                                         ENUMERATED {n1,n2,n3,n5,n10,n20,n40}
                                                                             OPTIONAL
FeatureSetDownlink-v1720 ::=
                                            SEQUENCE {
    -- R1 25-19: RTT-based Propagation delay compensation based on CSI-RS for tracking and SRS
```

```
ENUMERATED {supported}
   rtt-BasedPDC-CSI-RS-ForTracking-r17
                                                                                                                       OPTIONAL,
    -- R1 25-19a: RTT-based Propagation delay compensation based on DL PRS for RTT-based PDC and SRS
   rt.t-BasedPDC-PRS-r17
                                               SEOUENCE {
       maxNumberPRS-Resource-r17
                                                   ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
       maxNumberPRS-ResourceProcessedPerSlot-r17
                                                  SEQUENCE {
           scs-15kHz-r17
                                                       ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}
                                                                                                                       OPTIONAL.
           scs-30kHz-r17
                                                       ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}
                                                                                                                       OPTIONAL,
           scs-60kHz-r17
                                                       ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}
                                                                                                                       OPTIONAL,
           scs-120kHz-r17
                                                       ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}
                                                                                                                       OPTIONAL
                                                                                                                       OPTIONAL,
    -- R1 33-5-1: SPS group-common PDSCH for multicast on PCell
                                               ENUMERATED {supported}
    sps-Multicast-r17
                                                                                                                       OPTIONAL
FeatureSetDownlink-v1730 ::=
                                           SEOUENCE {
    -- R1 25-19b: Support of PRS as spatial relation RS for SRS
   prs-AsSpatialRelationRS-For-SRS-r17
                                               ENUMERATED {supported}
                                                                                                                       OPTIONAL
PDCCH-MonitoringOccasions-r16 ::= SEQUENCE {
   period7span3-r16
                                     ENUMERATED {supported}
                                                                           OPTIONAL,
   period4span3-r16
                                     ENUMERATED {supported}
                                                                           OPTIONAL,
   period2span2-r16
                                     ENUMERATED {supported}
                                                                           OPTIONAL
PDCCH-RepetitionParameters-r17 ::= SEOUENCE {
    supportedMode-r17
                                      ENUMERATED {intra-span, inter-span, both},
   limitX-PerCC-r17
                                      ENUMERATED {n4, n8, n16, n32, n44, n64, nolimit}
                                                                                                           OPTIONAL,
                                      ENUMERATED {n4, n8, n16, n32, n44, n64, n128, n256, n512, nolimit}
   limitX-AcrossCC-r17
                                                                                                           OPTIONAL
DummyA ::=
               SEOUENCE {
   maxNumberNZP-CSI-RS-PerCC
                                               INTEGER (1..32),
   maxNumberPortsAcrossNZP-CSI-RS-PerCC
                                               ENUMERATED {p2, p4, p8, p12, p16, p24, p32, p40, p48, p56, p64, p72, p80,
                                                          p88, p96, p104, p112, p120, p128, p136, p144, p152, p160, p168,
                                                          p176, p184, p192, p200, p208, p216, p224, p232, p240, p248, p256},
                                               ENUMERATED {n1, n2, n4, n8, n16, n32},
    maxNumberCS-IM-PerCC
   maxNumberSimultaneousCSI-RS-ActBWP-AllCC
                                               n28, n30, n32, n34, n36, n38, n40, n42, n44, n46, n48, n50, n52,
                                                              n54, n56, n58, n60, n62, n64},
    totalNumberPortsSimultaneousCSI-RS-ActBWP-AllCC ENUMERATED {p8, p12, p16, p24, p32, p40, p48, p56, p64, p72, p80,
                                                              p88, p96, p104, p112, p120, p128, p136, p144, p152, p160, p168,
                                                              p176, p184, p192, p200, p208, p216, p224, p232, p240, p248, p256}
DummvB ::=
                SEOUENCE
   maxNumberTxPortsPerResource
                                       ENUMERATED {p2, p4, p8, p12, p16, p24, p32},
   maxNumberResources
                                       INTEGER (1..64),
    totalNumberTxPorts
                                       INTEGER (2..256),
                                       ENUMERATED {mode1, mode1AndMode2},
    supportedCodebookMode
   maxNumberCSI-RS-PerResourceSet
                                       INTEGER (1..8)
```

```
DummyC ::=
                 SEOUENCE {
   maxNumberTxPortsPerResource
                                       ENUMERATED {p8, p16, p32},
   maxNumberResources
                                       INTEGER (1..64).
    totalNumberTxPorts
                                       INTEGER (2..256),
    supportedCodebookMode
                                       ENUMERATED {mode1, mode2, both},
                                       ENUMERATED {n2, n4},
    supportedNumberPanels
    maxNumberCSI-RS-PerResourceSet
                                       INTEGER (1..8)
DummvD ::=
                          SEOUENCE {
    maxNumberTxPortsPerResource
                                       ENUMERATED {p4, p8, p12, p16, p24, p32},
    maxNumberResources
                                       INTEGER (1..64),
    totalNumberTxPorts
                                       INTEGER (2..256),
    parameterLx
                                       INTEGER (2..4).
                                       ENUMERATED {wideband, widebandAndSubband},
    amplitudeScalingType
    amplitudeSubsetRestriction
                                       ENUMERATED {supported}
                                                                                        OPTIONAL,
                                       INTEGER (1..8)
    maxNumberCSI-RS-PerResourceSet
DummyE ::= SEQUENCE {
   maxNumberTxPortsPerResource
                                       ENUMERATED {p4, p8, p12, p16, p24, p32},
   maxNumberResources
                                       INTEGER (1..64),
    totalNumberTxPorts
                                       INTEGER (2..256),
    parameterLx
                                       INTEGER (2..4),
    amplitudeScalingType
                                       ENUMERATED {wideband, widebandAndSubband},
    maxNumberCSI-RS-PerResourceSet
                                       INTEGER (1..8)
-- TAG-FEATURESETDOWNLINK-STOP
-- ASN1STOP
```

FeatureSetDownlink field descriptions

featureSetListPerDownlinkCC

Indicates which features the UE supports on the individual DL carriers of the feature set (and hence of a band entry that refer to the feature set). The UE shall hence include at least as many FeatureSetDownlinkPerCC-Id in this list as the number of carriers it supports according to the ca-BandwidthClassDL, except if indicating additional functionality by reducing the number of FeatureSetDownlinkPerCC-Id in the feature set (see NOTE 1 in FeatureSetCombination IE description). The order of the elements in this list is not relevant, i.e., the network may configure any of the carriers in accordance with any of the FeatureSetDownlinkPerCC-Id in this list.

supportedSRS-Resources

Indicates supported SRS resources for SRS carrier switching to the band associated with this FeatureSetDownlink. The UE is only allowed to set this field for a band with associated FeatureSetUplinkId set to 0.

FeatureSetDownlinkId

The IE FeatureSetDownlinkId identifies a downlink feature set. The FeatureSetDownlinkId of a FeatureSetDownlink is the index position of the FeatureSetDownlink in the featureSetsDownlink list in the FeatureSets IE. The first element in that list is referred to by FeatureSetDownlinkId = 1. The FeatureSetDownlinkId=0 is not used by an actual FeatureSetDownlink but means that the UE does not support a carrier in this band of a band combination.

FeatureSetDownlinkId information element

```
-- ASN1START
-- TAG-FEATURESETDOWNLINKID-START

FeatureSetDownlinkId ::= INTEGER (0..maxDownlinkFeatureSets)
-- TAG-FEATURESETDOWNLINKID-STOP
-- ASN1STOP
```

FeatureSetDownlinkPerCC

The IE FeatureSetDownlinkPerCC indicates a set of features that the UE supports on the corresponding carrier of one band entry of a band combination.

FeatureSetDownlinkPerCC information element

```
-- ASN1START
-- TAG-FEATURESETDOWNLINKPERCC-START
FeatureSetDownlinkPerCC ::=
                                    SEQUENCE {
    supportedSubcarrierSpacingDL
                                        SubcarrierSpacing,
    supportedBandwidthDL
                                        SupportedBandwidth,
    channelBW-90mhz
                                        ENUMERATED {supported}
                                                                                                                OPTIONAL,
    maxNumberMIMO-LayersPDSCH
                                        MIMO-LayersDL
                                                                                                                OPTIONAL,
    supportedModulationOrderDL
                                        ModulationOrder
                                                                                                                OPTIONAL
FeatureSetDownlinkPerCC-v1620 ::= SEOUENCE {
    -- R1 16-2a: Mulit-DCI based multi-TRP
   multiDCI-MultiTRP-r16
                                        MultiDCI-MultiTRP-r16
                                                                                                                OPTIONAL,
    -- R1 16-2b-3: Support of single-DCI based FDMSchemeB
                                       ENUMERATED {supported}
    supportFDM-SchemeB-r16
                                                                                                                OPTIONAL
FeatureSetDownlinkPerCC-v1700 ::= SEQUENCE {
    supportedMinBandwidthDL-r17
                                            SupportedBandwidth-v1700
                                                                                                                     OPTIONAL,
                                           ENUMERATED {supported}
   broadcastSCell-r17
                                                                                                                    OPTIONAL,
    -- R1 33-2g: MIMO layers for multicast PDSCH
    maxNumberMIMO-LayersMulticastPDSCH-r17 ENUMERATED {n2, n4, n8}
                                                                                                                     OPTIONAL,
    -- R1 33-2h: Dynamic scheduling for multicast for SCell
    dynamicMulticastSCell-r17
                                            ENUMERATED {supported}
                                                                                                                     OPTIONAL,
                                            SupportedBandwidth-v1700
    supportedBandwidthDL-v1710
                                                                                                                     OPTIONAL,
    -- R4 24-1/24-2/24-3/24-4/24-5
                                            CRS-InterfMitigation-r17
    supportedCRS-InterfMitigation-r17
                                                                                                                     OPTIONAL
FeatureSetDownlinkPerCC-v1720 ::= SEQUENCE {
    -- R1 33-2j: Supported maximum modulation order used for maximum data rate calculation for multicast PDSCH
   maxModulationOrderForMulticastDataRateCalculation-r17 ENUMERATED {gam64, gam256, gam1024}
                                                                                                                OPTIONAL,
    -- R1 33-1-2: FDM-ed unicast PDSCH and group-common PDSCH for broadcast
    fdm-BroadcastUnicast-r17
                                        ENUMERATED {supported}
                                                                                                                OPTIONAL,
```

```
-- R1 33-3-2: FDM-ed unicast PDSCH and one group-common PDSCH for multicast
    fdm-MulticastUnicast-r17
                                        ENUMERATED {supported}
                                                                                                                OPTIONAL
FeatureSetDownlinkPerCC-v1730 ::=
                                            SEOUENCE {
    -- R1 33-3-3: Intra-slot TDM-ed unicast PDSCH and group-common PDSCH
   intraSlotTDM-UnicastGroupCommonPDSCH-r17
                                               ENUMERATED {yes, no}
                                                                                        OPTIONAL,
    -- R1 33-5-3: One SPS group-common PDSCH configuration for multicast for SCell
    sps-MulticastSCell-r17
                                                ENUMERATED {supported}
                                                                                        OPTIONAL,
    -- R1 33-5-4: Up to 8 SPS group-common PDSCH configurations per CFR for multicast for SCell
    sps-MulticastSCellMultiConfig-r17
                                                INTEGER (1..8)
                                                                                        OPTIONAL,
    -- R1 33-1-1: Dynamic slot-level repetition for broadcast MTCH
    dci-BroadcastWith16Repetitions-r17
                                                ENUMERATED {supported}
                                                                                        OPTIONAL
MultiDCI-MultiTRP-r16 ::=
                                    SEOUENCE {
                                        ENUMERATED {n2, n3, n4, n5},
    maxNumberCORESET-r16
    maxNumberCORESETPerPoolIndex-r16
                                        INTEGER (1..3),
                                       ENUMERATED {n1, n2, n3, n4, n7}
    maxNumberUnicastPDSCH-PerPool-r16
CRS-InterfMitigation-r17 ::=
                                    SEQUENCE {
    -- R4 24-1 CRS-IM (Interference Mitigation) in DSS scenario
    crs-IM-DSS-15kHzSCS-r17
                                        ENUMERATED {supported}
                                                                                                                OPTIONAL,
    -- R4 24-2 CRS-IM in non-DSS and 15 kHz NR SCS scenario, without the assistance of network signaling on LTE channel bandwidth
    crs-IM-nonDSS-15kHzSCS-r17
                                        ENUMERATED {supported}
                                                                                                                OPTIONAL,
    -- R4 24-3 CRS-IM in non-DSS and 15 kHz NR SCS scenario, with the assistance of network signaling on LTE channel bandwidth
    crs-IM-nonDSS-NWA-15kHzSCS-r17
                                       ENUMERATED {supported}
                                                                                                                OPTIONAL,
    -- R4 24-4 CRS-IM in non-DSS and 30 kHz NR SCS scenario, without the assistance of network signaling on LTE channel bandwidth
    crs-IM-nonDSS-30kHzSCS-r17
                                        ENUMERATED {supported}
                                                                                                                OPTIONAL,
    -- R4 24-5 CRS-IM in non-DSS and 30 kHz NR SCS scenario, with the assistance of network signaling on LTE channel bandwidth
    crs-IM-nonDSS-NWA-30kHzSCS-r17
                                       ENUMERATED {supported}
                                                                                                                OPTIONAL
-- TAG-FEATURESETDOWNLINKPERCC-STOP
-- ASN1STOP
```

FeatureSetDownlinkPerCC-Id

The IE FeatureSetDownlinkPerCC-Id identifies a set of features applicable to one carrier of a feature set. The FeatureSetDownlinkPerCC-Id of a FeatureSetDownlinkPerCC is the index position of the FeatureSetDownlinkPerCC in the featureSetsDownlinkPerCC. The first element in the list is referred to by FeatureSetDownlinkPerCC-Id = 1, and so on.

FeatureSetDownlinkPerCC-Id information element

```
-- ASN1START
-- TAG-FEATURESETDOWNLINKPERCC-ID-START

FeatureSetDownlinkPerCC-Id ::= INTEGER (1..maxPerCC-FeatureSets)
```

-- TAG-FEATURESETDOWNLINKPERCC-ID-STOP
-- ASN1STOP

FeatureSetEUTRA-DownlinkId

The IE FeatureSetEUTRA-DownlinkId identifies a downlink feature set in E-UTRA list (see TS 36.331 [10]. The first element in that list is referred to by FeatureSetEUTRA-DownlinkId = 1. The FeatureSetEUTRA-DownlinkId=0 is used when the UE does not support a carrier in this band of a band combination.

FeatureSetEUTRA-DownlinkId information element

```
-- ASN1START
-- TAG-FEATURESETEUTRADOWNLINKID-START

FeatureSetEUTRA-DownlinkId ::= INTEGER (0..maxEUTRA-DL-FeatureSets)
-- TAG-FEATURESETEUTRADOWNLINKID-STOP
-- ASN1STOP
```

FeatureSetEUTRA-UplinkId

The IE FeatureSetEUTRA-UplinkId identifies an uplink feature set in E-UTRA list (see TS 36.331 [10]. The first element in that list is referred to by FeatureSetEUTRA-UplinkId = 1. The FeatureSetEUTRA-UplinkId = 0 is used when the UE does not support a carrier in this band of a band combination.

FeatureSetEUTRA-UplinkId information element

```
-- ASN1START
-- TAG-FEATURESETEUTRAUPLINKID-START

FeatureSetEUTRA-UplinkId ::= INTEGER (0..maxEUTRA-UL-FeatureSets)

-- TAG-FEATURESETEUTRAUPLINKID-STOP
-- ASN1STOP
```

FeatureSets

The IE FeatureSets is used to provide pools of downlink and uplink features sets. A FeatureSetCombination refers to the IDs of the feature set(s) that the UE supports in that FeatureSetCombination. The BandCombination entries in the BandCombinationList then indicate the ID of the FeatureSetCombination that the UE supports for that band combination.

The entries in the lists in this IE are identified by their index position. For example, the *FeatureSetUplinkPerCC-Id* = 4 identifies the 4th element in the *featureSetsUplinkPerCC* list.

NOTE: When feature sets (per CC) IEs require extension in future versions of the specification, new versions of the FeatureSetDownlink, FeatureSetUplink, FeatureSets, FeatureSetDownlinkPerCC and/or FeatureSetUplinkPerCC will be created and instantiated in corresponding new lists in the FeatureSets IE. For example, if new capability bits are to be added to the FeatureSetDownlink, they will instead be defined in a new FeatureSetDownlink-rxy which will be instantiated in a new featureSetDownlinkList-rxy list. If a UE indicates in a FeatureSetCombination that it supports the FeatureSetDownlink with ID #5, it implies that it supports both the features in FeatureSetDownlink #5 and FeatureSetDownlink-rxy #5 (if present). The number of entries in the new list(s) shall be the same as in the original list(s).

FeatureSets information element

```
-- ASN1START
-- TAG-FEATURESETS-START
FeatureSets ::=
                  SEQUENCE {
    featureSetsDownlink
                                        SEOUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink
                                                                                                                          OPTIONAL,
    featureSetsDownlinkPerCC
                                        SEOUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC
                                                                                                                          OPTIONAL,
    featureSetsUplink
                                        SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink
                                                                                                                          OPTIONAL,
    featureSetsUplinkPerCC
                                        SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC
                                                                                                                          OPTIONAL,
    ГΓ
    featureSetsDownlink-v1540
                                        SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1540
                                                                                                                          OPTIONAL,
    featureSetsUplink-v1540
                                        SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1540
                                                                                                                          OPTIONAL,
    featureSetsUplinkPerCC-v1540
                                        SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v1540
                                                                                                                          OPTIONAL
    ]],
    11
    featureSetsDownlink-v15a0
                                        SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v15a0
                                                                                                                          OPTIONAL
    11
    featureSetsDownlink-v1610
                                        SEOUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1610
                                                                                                                          OPTIONAL,
    featureSetsUplink-v1610
                                        SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1610
                                                                                                                          OPTIONAL,
    featureSetDownlinkPerCC-v1620
                                        SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1620
                                                                                                                          OPTIONAL
    ]],
    Π
    featureSetsUplink-v1630
                                        SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1630
                                                                                                                          OPTIONAL
    ]],
    [ [
    featureSetsUplink-v1640
                                        SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1640
                                                                                                                          OPTIONAL
    ]],
    11
    featureSetsDownlink-v1700
                                        SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1700
                                                                                                                          OPTIONAL,
    featureSetsDownlinkPerCC-v1700
                                        SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1700
                                                                                                                          OPTIONAL,
    featureSetsUplink-v1710
                                        SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1710
                                                                                                                          OPTIONAL,
    featureSetsUplinkPerCC-v1700
                                        SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v1700
                                                                                                                          OPTIONAL
    ]],
    П
    featureSetsDownlink-v1720
                                        SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1720
                                                                                                                          OPTIONAL,
                                        SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1720
    featureSetsDownlinkPerCC-v1720
                                                                                                                          OPTIONAL,
    featureSetsUplink-v1720
                                        SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1720
                                                                                                                          OPTIONAL
    ]],
    11
    featureSetsDownlink-v1730
                                        SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1730
                                                                                                                          OPTIONAL,
    featureSetsDownlinkPerCC-v1730
                                        SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1730
                                                                                                                          OPTIONAL
    11
```

```
}
-- TAG-FEATURESETS-STOP
-- ASN1STOP
```

FeatureSetUplink

The IE FeatureSetUplink is used to indicate the features that the UE supports on the carriers corresponding to one band entry in a band combination.

FeatureSetUplink information element

```
-- ASN1START
-- TAG-FEATURESETUPLINK-START
FeatureSetUplink ::=
                                     SEOUENCE {
    featureSetListPerUplinkCC
                                         SEQUENCE (SIZE (1.. maxNrofServingCells)) OF FeatureSetUplinkPerCC-Id,
    scalingFactor
                                         ENUMERATED {f0p4, f0p75, f0p8}
                                                                                                                   OPTIONAL,
    dummy3
                                         ENUMERATED {supported}
                                                                                                                   OPTIONAL,
    intraBandFreqSeparationUL
                                         FreqSeparationClass
                                                                                                                   OPTIONAL,
    searchSpaceSharingCA-UL
                                         ENUMERATED {supported}
                                                                                                                   OPTIONAL,
    dummy1
                                         DummyI
                                                                                                                   OPTIONAL,
    supportedSRS-Resources
                                         SRS-Resources
                                                                                                                   OPTIONAL,
    twoPUCCH-Group
                                         ENUMERATED {supported}
                                                                                                                   OPTIONAL,
    dynamicSwitchSUL
                                         ENUMERATED {supported}
                                                                                                                   OPTIONAL,
                                         ENUMERATED {supported}
    simultaneousTxSUL-NonSUL
                                                                                                                   OPTIONAL,
    pusch-ProcessingType1-DifferentTB-PerSlot SEQUENCE {
        scs-15kHz
                                                                                                                       OPTIONAL,
                                                   ENUMERATED {upto2, upto4, upto7}
        scs-30kHz
                                                   ENUMERATED
                                                               {upto2, upto4, upto7}
                                                                                                                       OPTIONAL,
        scs-60kHz
                                                               {upto2, upto4, upto7}
                                                                                                                       OPTIONAL,
                                                   ENUMERATED
        scs-120kHz
                                                   ENUMERATED {upto2, upto4, upto7}
                                                                                                                       OPTIONAL
                                                                                                                   OPTIONAL,
                                                                                                                   OPTIONAL
    dummy2
                                          DummyF
FeatureSetUplink-v1540 ::=
                                     SEOUENCE {
    zeroSlotOffsetAperiodicSRS
                                          ENUMERATED {supported}
                                                                                      OPTIONAL,
                                          ENUMERATED {supported}
    pa-PhaseDiscontinuityImpacts
                                                                                      OPTIONAL,
    pusch-SeparationWithGap
                                          ENUMERATED {supported}
                                                                                      OPTIONAL,
    pusch-ProcessingType2
                                          SEQUENCE {
        scs-15kHz
                                              ProcessingParameters
                                                                                          OPTIONAL,
        scs-30kHz
                                              ProcessingParameters
                                                                                          OPTIONAL,
        scs-60kHz
                                              ProcessingParameters
                                                                                          OPTIONAL
                                                                                      OPTIONAL,
                                          ENUMERATED {supported}
    ul-MCS-TableAlt-DynamicIndication
                                                                                      OPTIONAL
FeatureSetUplink-v1610 ::=
                                 SEQUENCE
    -- R1 11-5: PUSCH repetition Type B
    pusch-RepetitionTypeB-r16
                                     SEOUENCE {
        maxNumberPUSCH-Tx-r16
                                          ENUMERATED {n2, n3, n4, n7, n8, n12},
        hoppingScheme-r16
                                          ENUMERATED {interSlotHopping, interRepetitionHopping, both}
```

```
OPTIONAL,
-- R1 11-7: UL cancelation scheme for self-carrier
ul-CancellationSelfCarrier-r16
                                     ENUMERATED {supported}
                                                                                OPTIONAL.
-- R1 11-7a: UL cancelation scheme for cross-carrier
ul-CancellationCrossCarrier-r16
                                     ENUMERATED {supported}
-- R1 16-5c: The maximum number of SRS resources in one SRS resource set with usage set to 'codebook' for Mode 2
ul-FullPwrMode2-MaxSRS-ResInSet-r16 ENUMERATED {n1, n2, n4}
                                                                               OPTIONAL.
-- R1 22-4a/4b/4c/4d: CBG based transmission for UL with unicast PUSCH(s) per slot per CC with UE processing time Capability 1
cbqPUSCH-ProcessingTypel-DifferentTB-PerSlot-r16 SEQUENCE {
   scs-15kHz-r16
                         ENUMERATED {one-pusch, upto2, upto4, upto7}
                                                                                    OPTIONAL.
   scs-30kHz-r16
                         ENUMERATED {one-pusch, upto2, upto4, upto7}
                                                                                    OPTIONAL.
   scs-60kHz-r16
                         ENUMERATED {one-pusch, upto2, upto4, upto7}
                                                                                   OPTIONAL,
   scs-120kHz-r16
                         ENUMERATED {one-pusch, upto2, upto4, upto7}
                                                                                    OPTIONAL
} OPTIONAL,
-- R1 22-3a/3b/3c/3d: CBG based transmission for UL with unicast PUSCH(s) per slot per CC with UE processing time Capability 2
cbqPUSCH-ProcessinqType2-DifferentTB-PerSlot-r16
                                                 SEOUENCE {
   scs-15kHz-r16
                         ENUMERATED {one-pusch, upto2, upto4, upto7}
                                                                                    OPTIONAL,
   scs-30kHz-r16
                         ENUMERATED {one-pusch, upto2, upto4, upto7}
                                                                                   OPTIONAL,
   scs-60kHz-r16
                         ENUMERATED {one-pusch, upto2, upto4, upto7}
                                                                                   OPTIONAL,
   scs-120kHz-r16
                         ENUMERATED {one-pusch, upto2, upto4, upto7}
                                                                                   OPTIONAL
} OPTIONAL,
supportedSRS-PosResources-r16
                                           SRS-AllPosResources-r16
                                                                               OPTIONAL,
intraFreqDAPS-UL-r16
                                                 SEQUENCE {
    dummy
                                                     ENUMERATED {supported}
                                                                                OPTIONAL.
   intraFreqTwoTAGs-DAPS-r16
                                                     ENUMERATED {supported}
                                                                               OPTIONAL,
   dummy1
                                                     ENUMERATED {supported}
                                                                               OPTIONAL,
   dummy2
                                                     ENUMERATED {supported}
                                                                               OPTIONAL,
    dummy3
                                                     ENUMERATED {short, long}
                                                                               OPTIONAL
                                                                                OPTIONAL,
intraBandFreqSeparationUL-v1620
                                                 FreqSeparationClassUL-v1620
                                                                               OPTIONAL,
-- R1 11-3: More than one PUCCH for HARQ-ACK transmission within a slot
multiPUCCH-r16
                                      SEOUENCE {
   sub-SlotConfig-NCP-r16
                                          ENUMERATED {set1, set2}
                                                                               OPTIONAL,
   sub-SlotConfig-ECP-r16
                                          ENUMERATED {set1, set2}
                                                                               OPTIONAL
                                                                               OPTIONAL,
-- R1 11-3c: 2 PUCCH of format 0 or 2 for a single 7*2-symbol subslot based HARO-ACK codebook
twoPUCCH-Type1-r16
                                      ENUMERATED {supported}
                                                                                OPTIONAL,
-- R1 11-3d: 2 PUCCH of format 0 or 2 for a single 2*7-symbol subslot based HARQ-ACK codebook
                                      ENUMERATED {supported}
twoPUCCH-Type2-r16
                                                                               OPTIONAL,
-- R1 11-3e: 1 PUCCH format 0 or 2 and 1 PUCCH format 1, 3 or 4 in the same subslot for a single 2*7-symbol HARQ-ACK codebooks
                                      ENUMERATED {supported}
twoPUCCH-Type3-r16
                                                                               OPTIONAL,
-- R1 11-3f: 2 PUCCH transmissions in the same subslot for a single 2*7-symbol HARO-ACK codebooks which are not covered by 11-3d and
-- 11-3e
twoPUCCH-Type4-r16
                                      ENUMERATED {supported}
                                                                                OPTIONAL,
-- R1 11-3q: SR/HARQ-ACK multiplexing once per subslot using a PUCCH (or HARQ-ACK piggybacked on a PUSCH) when SR/HARQ-ACK
-- are supposed to be sent with different starting symbols in a subslot
mux-SR-HARO-ACK-r16
                                      ENUMERATED {supported}
                                                                               OPTIONAL,
                                      ENUMERATED {supported}
dummy1
                                                                               OPTIONAL,
dummy2
                                      ENUMERATED {supported}
                                                                               OPTIONAL,
-- R1 11-4c: 2 PUCCH of format 0 or 2 for two HARQ-ACK codebooks with one 7*2-symbol sub-slot based HARQ-ACK codebook
                                      ENUMERATED {supported}
twoPUCCH-Type5-r16
                                                                               OPTIONAL,
```

```
-- R1 11-4d: 2 PUCCH of format 0 or 2 in consecutive symbols for two HARO-ACK codebooks with one 2*7-symbol sub-slot based HARO-ACK
    -- codebook
    twoPUCCH-Type6-r16
                                        ENUMERATED {supported}
                                                                                OPTIONAL.
    -- R1 11-4e: 2 PUCCH of format 0 or 2 for two subslot based HARO-ACK codebooks
    twoPUCCH-Type7-r16
                                        ENUMERATED {supported}
                                                                                OPTIONAL.
    -- R1 11-4f: 1 PUCCH format 0 or 2 and 1 PUCCH format 1, 3 or 4 in the same subslot for HARO-ACK codebooks with one 2*7-symbol
    -- subslot based HARO-ACK codebook
    twoPUCCH-Type8-r16
                                        ENUMERATED {supported}
                                                                                OPTIONAL,
    -- R1 11-4q: 1 PUCCH format 0 or 2 and 1 PUCCH format 1, 3 or 4 in the same subslot for two subslot based HARQ-ACK codebooks
                                        ENUMERATED {supported}
    twoPUCCH-Type9-r16
                                                                                OPTIONAL,
    -- R1 11-4h: 2 PUCCH transmissions in the same subslot for two HARQ-ACK codebooks with one 2*7-symbol subslot which are not covered
    -- by 11-4c and 11-4e
                                        ENUMERATED {supported}
    twoPUCCH-Type10-r16
                                                                                OPTIONAL,
    -- R1 11-4i: 2 PUCCH transmissions in the same subslot for two subslot based HARO-ACK codebooks which are not covered by 11-4d and
    -- 11-4f
    twoPUCCH-Type11-r16
                                        ENUMERATED {supported}
                                                                                OPTIONAL.
    -- R1 12-1: UL intra-UE multiplexing/prioritization of overlapping channel/signals with two priority levels in physical layer
   ul-IntraUE-Mux-r16
                                        SEOUENCE {
       pusch-PreparationLowPriority-r16
                                            ENUMERATED {sym0, sym1, sym2},
                                            ENUMERATED {sym0, sym1, sym2}
       pusch-PreparationHighPriority-r16
                                                                                OPTIONAL,
    -- R1 16-5a: Supported UL full power transmission mode of fullpower
   ul-FullPwrMode-r16
                                        ENUMERATED {supported}
                                                                                OPTIONAL,
    -- R1 18-5d: Processing up to X unicast DCI scheduling for UL per scheduled CC
    scs-15kHz-120kHz-r16
                                            ENUMERATED {n1,n2,n4}
                                                                                OPTIONAL.
       scs-15kHz-60kHz-r16
                                            ENUMERATED {n1,n2,n4}
                                                                                OPTIONAL,
       scs-30kHz-120kHz-r16
                                            ENUMERATED {n1,n2,n4}
                                                                                OPTIONAL,
                                            ENUMERATED {n2}
       scs-15kHz-30kHz-r16
                                                                                OPTIONAL,
       scs-30kHz-60kHz-r16
                                            ENUMERATED {n2}
                                                                                OPTIONAL,
       scs-60kHz-120kHz-r16
                                            ENUMERATED {n2}
                                                                                OPTIONAL
                                                                                OPTIONAL,
    -- R1 16-5b: Supported UL full power transmission mode of fullpowerModel
    ul-FullPwrMode1-r16
                                        ENUMERATED {supported}
                                                                                OPTIONAL,
    -- R1 16-5c-2: Ports configuration for Mode 2
   ul-FullPwrMode2-SRSConfig-diffNumSRSPorts-r16 ENUMERATED {p1-2, p1-4, p1-2-4} OPTIONAL,
    -- R1 16-5c-3: TPMI group for Mode 2
    ul-FullPwrMode2-TPMIGroup-r16
                                        SEOUENCE {
       twoPorts-r16
                                            BIT STRING(SIZE(2))
                                                                                    OPTIONAL,
       fourPortsNonCoherent-r16
                                            ENUMERATED{g0, g1, g2, g3}
                                                                                    OPTIONAL,
       fourPortsPartialCoherent-r16
                                            ENUMERATED { g0, g1, g2, g3, g4, g5, g6 }
                                                                                   OPTIONAL
                                                                                    OPTIONAL
FeatureSetUplink-v1630 ::=
                               SEOUENCE {
    -- R1 22-8: For SRS for CB PUSCH and antenna switching on FR1 with symbol level offset for aperiodic SRS transmission
                                                             ENUMERATED {supported}
   offsetSRS-CB-PUSCH-Ant-Switch-fr1-r16
   -- R1 22-8a: PDCCH monitoring on any span of up to 3 consecutive OFDM symbols of a slot and constrained timeline for SRS for CB
    -- PUSCH and antenna switching on FR1
   offsetSRS-CB-PUSCH-PDCCH-MonitorSingleOcc-fr1-r16
                                                             ENUMERATED {supported}
    -- R1 22-8b: For type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS, monitoring occasion can be any OFDM symbol(s)
    -- of a slot for Case 2 and constrained timeline for SRS for CB PUSCH and antenna switching on FR1
   OPTIONAL.
   -- R1 22-8c: For type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS, monitoring occasion can be any OFDM symbol(s)
```

```
-- of a slot for Case 2 with a DCI gap and constrained timeline for SRS for CB PUSCH and antenna switching on FR1
    offsetSRS-CB-PUSCH-PDCCH-MonitorAnyOccWithGap-fr1-r16
                                                               ENUMERATED {supported}
                                                               ENUMERATED {supported}
                                                                                                       OPTIONAL.
    -- R1 22-9: Cancellation of PUCCH, PUSCH or PRACH with a DCI scheduling a PDSCH or CSI-RS or a DCI format 2 0 for SFI
    partialCancellationPUCCH-PUSCH-PRACH-TX-r16
                                                               ENUMERATED {supported}
FeatureSetUplink-v1640 ::=
                                       SEOUENCE {
   -- R1 11-4: Two HARQ-ACK codebooks with up to one sub-slot based HARQ-ACK codebook (i.e. slot-based + slot-based, or slot-based +
    -- sub-slot based) simultaneously constructed for supporting HARQ-ACK codebooks with different priorities at a UE
    twoHARQ-ACK-Codebook-type1-r16
                                           SubSlot-Config-r16
                                                                  OPTIONAL,
    -- R1 11-4a: Two sub-slot based HARQ-ACK codebooks simultaneously constructed for supporting HARQ-ACK codebooks with different
    -- priorities at a UE
    twoHARO-ACK-Codebook-type2-r16
                                           SubSlot-Config-r16
                                                                   OPTIONAL.
    -- R1 22-8d: All PDCCH monitoring occasion can be any OFDM symbol(s) of a slot for Case 2 with a span gap and constrained timeline
    -- for SRS for CB PUSCH and antenna switching on FR1
    offsetSRS-CB-PUSCH-PDCCH-MonitorAnyOccWithSpanGap-fr1-r16 SEQUENCE {
       scs-15kHz-r16
                                                     ENUMERATED {set1, set2, set3}
                                                                                                              OPTIONAL,
       scs-30kHz-r16
                                                     ENUMERATED {set1, set2, set3}
                                                                                                              OPTIONAL,
       scs-60kHz-r16
                                                     ENUMERATED {set1, set2, set3}
                                                                                                              OPTIONAL
                                                                                                              OPTIONAL
FeatureSetUplink-v1710 ::= SEOUENCE {
    -- R1 23-3-1 Multi-TRP PUSCH repetition (type A) -codebook based
    mTRP-PUSCH-TypeA-CB-r17
                                          ENUMERATED {n1,n2,n4}
                                                                                            OPTIONAL,
    -- R1 23-3-1-2 Multi-TRP PUSCH repetition (type A) - non-codebook based
   mTRP-PUSCH-RepetitionTypeA-r17
                                          ENUMERATED {n1,n2,n3,n4}
                                                                                            OPTIONAL,
    -- R1 23-3-3 Multi-TRP PUCCH repetition-intra-slot
                                          ENUMERATED {pf0-2, pf1-3-4, pf0-4}
    mTRP-PUCCH-IntraSlot-r17
                                                                                            OPTIONAL,
    -- R1 23-8-4
                   Maximum 2 SP and 1 periodic SRS sets for antenna switching
    OPTIONAL,
    -- R1 23-8-9
                   Extension of aperiodic SRS configuration for 1T4R, 1T2R and 2T4R
                                          ENUMERATED {supported}
    srs-ExtensionAperiodicSRS-r17
                                                                                            OPTIONAL,
    -- R1 23-8-10 1 aperiodic SRS resource set for 1T4R
    srs-OneAP-SRS-r17
                                          ENUMERATED {supported}
                                                                                            OPTIONAL,
    -- R4 16-8 UE power class per band per band combination
                                          ENUMERATED {pcldot5, pc2, pc3}
    ue-PowerClassPerBandPerBC-r17
                                                                                            OPTIONAL,
    -- R4 17-8 UL transmission in FR2 bands within an UL gap when the UL gap is activated
    tx-Support-UL-GapFR2-r17
                                          ENUMERATED {supported}
                                                                                            OPTIONAL
FeatureSetUplink-v1720 ::= SEQUENCE {
    -- R1 25-3: Repetitions for PUCCH format 0, 1, 2, 3 and 4 over multiple PUCCH subslots with configured K = 2, 4, 8
    pucch-Repetition-F0-1-2-3-4-RRC-Config-r17
                                                     ENUMERATED {supported}
                                                                                            OPTIONAL,
    -- R1 25-3a: Repetitions for PUCCH format 0, 1, 2, 3 and 4 over multiple PUCCH subslots using dynamic repetition indication
    pucch-Repetition-F0-1-2-3-4-DynamicIndication-r17 ENUMERATED {supported}
                                                                                            OPTIONAL,
    -- R1 25-3b: Inter-subslot frequency hopping for PUCCH repetitions
    interSubslotFreqHopping-PUCCH-r17
                                                      ENUMERATED {supported}
                                                                                            OPTIONAL,
    -- R1 25-8: Semi-static HARO-ACK codebook for sub-slot PUCCH
    semiStaticHARO-ACK-CodebookSub-SlotPUCCH-r17
                                                      ENUMERATED {supported}
                                                                                            OPTIONAL,
    -- R1 25-14: PHY prioritization of overlapping low-priority DG-PUSCH and high-priority CG-PUSCH
    phy-PrioritizationLowPriorityDG-HighPriorityCG-r17 INTEGER(1..16)
    -- R1 25-15: PHY prioritization of overlapping high-priority DG-PUSCH and low-priority CG-PUSCH
```

```
phy-PrioritizationHighPriorityDG-LowPriorityCG-r17 SEQUENCE {
        pusch-PreparationLowPriority-r17
                                                            ENUMERATED{sym0, sym1, sym2},
        additionalCancellationTime-r17
                                                            SEQUENCE {
            scs-15kHz-r17
                                                                ENUMERATED{sym0, sym1, sym2}
                                                                                               OPTIONAL.
            scs-30kHz-r17
                                                                ENUMERATED{sym0, sym1, sym2, sym3, sym4}
                                                                                                             OPTIONAL.
            scs-60kHz-r17
                                                                ENUMERATED (sym0, sym1, sym2, sym3, sym4, sym5, sym6, sym7, sym8) OPTIONAL,
            scs-120kHz-r17
                                                                ENUMERATED(sym0, sym1, sym2, sym3, sym4, sym5, sym6, sym7, sym8, sym9,
                                                                           sym10, sym11, sym12, sym13, sym14, sym15, sym16}
       maxNumberCarriers-r17
                                                            INTEGER(1..16)
                                                                                               OPTIONAL,
    -- R4 17-5 Support of UL DC location(s) report
                                                        ENUMERATED {supported}
    extendedDC-LocationReport-r17
                                                                                               OPTIONAL
SubSlot-Config-r16 ::=
                                        SEOUENCE {
    sub-SlotConfig-NCP-r16
                                            ENUMERATED {n4,n5,n6,n7}
                                                                                   OPTIONAL,
    sub-SlotConfig-ECP-r16
                                            ENUMERATED {n4,n5,n6}
                                                                                   OPTIONAL
SRS-AllPosResources-r16 ::=
                                          SEOUENCE {
    srs-PosResources-r16
                                              SRS-PosResources-r16,
    srs-PosResourceAP-r16
                                              SRS-PosResourceAP-r16
                                                                                    OPTIONAL,
    srs-PosResourceSP-r16
                                              SRS-PosResourceSP-r16
                                                                                    OPTIONAL
SRS-PosResources-r16 ::=
                                               SEOUENCE {
    maxNumberSRS-PosResourceSetPerBWP-r16
                                                          ENUMERATED {n1, n2, n4, n8, n12, n16},
                                                         ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
    maxNumberSRS-PosResourcesPerBWP-r16
    maxNumberSRS-ResourcesPerBWP-PerSlot-r16
                                                          ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14},
    maxNumberPeriodicSRS-PosResourcesPerBWP-r16
                                                          ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
    maxNumberPeriodicSRS-PosResourcesPerBWP-PerSlot-r16 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}
                                         SEOUENCE {
SRS-PosResourceAP-r16 ::=
    maxNumberAP-SRS-PosResourcesPerBWP-r16
                                                   ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
    maxNumberAP-SRS-PosResourcesPerBWP-PerSlot-r16 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}
SRS-PosResourceSP-r16 ::=
                                                 SEOUENCE {
    maxNumberSP-SRS-PosResourcesPerBWP-r16
                                                          ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
    maxNumberSP-SRS-PosResourcesPerBWP-PerSlot-r16
                                                          ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}
SRS-Resources ::=
                                            SEOUENCE {
    maxNumberAperiodicSRS-PerBWP
                                                ENUMERATED {n1, n2, n4, n8, n16},
    maxNumberAperiodicSRS-PerBWP-PerSlot
                                                INTEGER (1..6),
    maxNumberPeriodicSRS-PerBWP
                                                ENUMERATED {n1, n2, n4, n8, n16},
    maxNumberPeriodicSRS-PerBWP-PerSlot
                                                INTEGER (1..6),
    maxNumberSemiPersistentSRS-PerBWP
                                                ENUMERATED {n1, n2, n4, n8, n16},
    maxNumberSemiPersistentSRS-PerBWP-PerSlot
                                                INTEGER (1..6),
    maxNumberSRS-Ports-PerResource
                                                ENUMERATED {n1, n2, n4}
```

```
DummyF ::= SEQUENCE {
   maxNumberPeriodicCSI-ReportPerBWP INTEGER (1..4),
   maxNumberAperiodicCSI-ReportPerBWP INTEGER (1..4),
   maxNumberSemiPersistentCSI-ReportPerBWP INTEGER (0..4),
   simultaneousCSI-ReportsAllCC INTEGER (5..32)
}
-- TAG-FEATURESETUPLINK-STOP
-- ASN1STOP
```

FeatureSetUplink field descriptions

featureSetListPerUplinkCC

Indicates which features the UE supports on the individual UL carriers of the feature set (and hence of a band entry that refers to the feature set). The UE shall hence include at least as many FeatureSetUplinkPerCC-Id in this list as the number of carriers it supports according to the ca-BandwidthClassUL, except if indicating additional functionality by reducing the number of FeatureSetUplinkPerCC-Id in the feature set (see NOTE 1 in FeatureSetCombination). The order of the elements in this list is not relevant, i.e., the network may configure any of the carriers in accordance with any of the FeatureSetUplinkPerCC-Id in this list.

FeatureSetUplinkId

The IE FeatureSetUplinkId identifies an uplink feature set. The FeatureSetUplinkId of a FeatureSetUplink is the index position of the FeatureSetUplink in the featureSetSUplink is the index position of the FeatureSetUplink in the featureSetSUplink is the index position of the FeatureSetUplink in the featureSetSUplink is the index position of the FeatureSetUplink in the featureSetSUplink in the featureSetSuplink is the index position of the FeatureSetUplink in the featureSetSuplink is the index position of the FeatureSetUplink in the featureSetSuplink is the index position of the FeatureSetUplink in the featureSetSuplink is the index position of the FeatureSetUplink in the featureSetSuplink is the index position of the FeatureSetUplink in the featureSetSuplink is the index position of the FeatureSetUplink in the featureSetSuplink is the index position of the FeatureSetUplink in the featureSetSuplink is the index position of the FeatureSetUplink in the featureSetUplinkId = 1, and so on. The FeatureSetUplinkId = 0 is not used by an actual FeatureSetUplink but means that the UE does not support a carrier in this band of a band combination.

FeatureSetUplinkId information element

```
-- ASN1START
-- TAG-FEATURESETUPLINKID-START

FeatureSetUplinkId ::= INTEGER (0..maxUplinkFeatureSets)
-- TAG-FEATURESETUPLINKID-STOP
-- ASN1STOP
```

- FeatureSetUplinkPerCC

The IE FeatureSetUplinkPerCC indicates a set of features that the UE supports on the corresponding carrier of one band entry of a band combination.

FeatureSetUplinkPerCC information element

```
-- ASN1START
-- TAG-FEATURESETUPLINKPERCC-START

FeatureSetUplinkPerCC ::= SEQUENCE {
    supportedSubcarrierSpacingUL SubcarrierSpacing,
    supportedBandwidthUL SupportedBandwidth,
```

```
ENUMERATED {supported}
    channelBW-90mhz
                                                                                         OPTIONAL,
   mimo-CB-PUSCH
                                            SEOUENCE {
       maxNumberMIMO-LayersCB-PUSCH
                                                MIMO-LayersUL
                                                                                             OPTIONAL.
       maxNumberSRS-ResourcePerSet
                                                INTEGER (1..2)
                                                                                         OPTIONAL,
   maxNumberMIMO-LayersNonCB-PUSCH
                                            MIMO-LayersUL
                                                                                         OPTIONAL,
    supportedModulationOrderUL
                                            ModulationOrder
                                                                                         OPTIONAL
FeatureSetUplinkPerCC-v1540 ::=
                                      SEOUENCE {
                                          SEQUENCE {
    mimo-NonCB-PUSCH
       maxNumberSRS-ResourcePerSet
                                              INTEGER (1..4),
       maxNumberSimultaneousSRS-ResourceTx INTEGER (1..4)
    } OPTIONAL
FeatureSetUplinkPerCC-v1700 ::=
                                  SEOUENCE {
    supportedMinBandwidthUL-r17
                                      SupportedBandwidth-v1700
                                                                                         OPTIONAL,
    -- R1 23-3-1-3 FeMIMO: Multi-TRP PUSCH repetition (type B) - non-codebook based
   mTRP-PUSCH-RepetitionTypeB-r17
                                      ENUMERATED {n1,n2,n3,n4}
                                                                                         OPTIONAL,
    -- R1 23-3-1-1 -codebook based Multi-TRP PUSCH repetition (type B)
   mTRP-PUSCH-TypeB-CB-r17
                                      ENUMERATED {n1,n2,n4}
                                                                                         OPTIONAL,
                                      SupportedBandwidth-v1700
    supportedBandwidthUL-v1710
                                                                                         OPTIONAL
-- TAG-FEATURESETUPLINKPERCC-STOP
-- ASN1STOP
```

FeatureSetUplinkPerCC-Id

The IE FeatureSetUplinkPerCC-Id identifies a set of features applicable to one carrier of a feature set. The FeatureSetUplinkPerCC-Id of a FeatureSetUplinkPerCC is the index position of the FeatureSetUplinkPerCC in the featureSetSuplinkPerCC. The first element in the list is referred to by FeatureSetUplinkPerCC-Id = 1, and so on.

FeatureSetUplinkPerCC-Id information element

```
-- ASN1START
-- TAG-FEATURESETUPLINKPERCC-ID-START

FeatureSetUplinkPerCC-Id ::= INTEGER (1..maxPerCC-FeatureSets)
-- TAG-FEATURESETUPLINKPERCC-ID-STOP
-- ASN1STOP
```

FregBandIndicatorEUTRA

```
-- ASN1START
-- TAG-FREQBANDINDICATOREUTRA-START

FreqBandIndicatorEUTRA ::= INTEGER (1..maxBandsEUTRA)
```

```
-- TAG-FREQBANDINDICATOREUTRA-STOP
-- ASN1STOP
```

- FreqBandList

The IE *FreqBandList* is used by the network to request NR CA, NR non-CA and/or MR-DC band combinations for specific NR and/or E-UTRA frequency bands and/or up to a specific number of carriers and/or up to specific aggregated bandwidth. This is also used to request feature sets (for NR) and feature set combinations (for NR and MR-DC). For NR sidelink communication, this is used by the initiating UE to request sidelink UE radio access capabilities from the peer UE.

FreqBandList information element

```
-- ASN1START
-- TAG-FREOBANDLIST-START
FreqBandList ::=
                                SEQUENCE (SIZE (1..maxBandsMRDC)) OF FreqBandInformation
FreqBandInformation ::=
                                CHOICE {
                                    FreqBandInformationEUTRA,
    bandInformationEUTRA
    bandInformationNR
                                    FreqBandInformationNR
FreqBandInformationEUTRA ::=
                                    FregBandIndicatorEUTRA,
    bandEUTRA
    ca-BandwidthClassDL-EUTRA
                                    CA-BandwidthClassEUTRA
                                                                            OPTIONAL,
                                                                                        -- Need N
    ca-BandwidthClassUL-EUTRA
                                    CA-BandwidthClassEUTRA
                                                                            OPTIONAL
                                                                                        -- Need N
FreqBandInformationNR ::=
                                SEQUENCE {
                                    FreqBandIndicatorNR,
    bandNR
    maxBandwidthRequestedDL
                                    AggregatedBandwidth
                                                                            OPTIONAL,
                                                                                       -- Need N
    maxBandwidthRequestedUL
                                    AggregatedBandwidth
                                                                            OPTIONAL,
                                                                                        -- Need N
    maxCarriersRequestedDL
                                    INTEGER (1..maxNrofServingCells)
                                                                            OPTIONAL,
                                                                                       -- Need N
    maxCarriersRequestedUL
                                    INTEGER (1..maxNrofServingCells)
                                                                                        -- Need N
                                                                            OPTIONAL
AggregatedBandwidth ::=
                                ENUMERATED {mhz50, mhz100, mhz150, mhz200, mhz250, mhz300, mhz350,
                                            mhz400, mhz450, mhz500, mhz550, mhz600, mhz650, mhz700, mhz750, mhz800}
-- TAG-FREQBANDLIST-STOP
-- ASN1STOP
```

FreqSeparationClass

The IE *FreqSeparationClass* is used for an intra-band non-contiguous CA band combination to indicate frequency separation between lower edge of lowest CC and upper edge of highest CC in a frequency band.

FreqSeparationClass information element

```
-- ASN1START
-- TAG-FREQSEPARATIONCLASS-START

FreqSeparationClass ::= ENUMERATED { mhz800, mhz1200, mhz1400, ..., mhz400-v1650, mhz600-v1650}

FreqSeparationClassDL-v1620 ::= ENUMERATED { mhz1000, mhz1600, mhz1800, mhz2000, mhz2200, mhz2400}

FreqSeparationClassUL-v1620 ::= ENUMERATED { mhz1000}

-- TAG-FREQSEPARATIONCLASS-STOP
-- ASN1STOP
```

FreqSeparationClassDL-Only

The IE *FreqSeparationClassDL-Only* is used to indicate the frequency separation between lower edge of lowest CC and upper edge of highest CC of DL only frequency spectrum in a frequency band.

FreqSeparationClassDL-Only information element

```
-- ASN1START
-- TAG-FREQSEPARATIONCLASSDL-Only-START

FreqSeparationClassDL-Only-r16 ::= ENUMERATED {mhz200, mhz400, mhz600, mhz800, mhz1000, mhz1200}

-- TAG-FREQSEPARATIONCLASSDL-Only-STOP
-- ASN1STOP
```

FR2-2-AccessParamsPerBand

The IE FR2-2-AccessParamsPerBand is used to convey FR2-2 related parameters specific for a certain frequency band (not per feature set or band combination).

FR2-2-AccessParamsPerBand information element

```
-- ASN1START
-- TAG-FR2-2-ACCESSPARAMSPERBAND-START
FR2-2-AccessParamsPerBand-r17 ::= SEQUENCE {
   -- R1 24-1: Basic FR2-2 DL support
   dl-FR2-2-SCS-120kHz-r17
                                   ENUMERATED {supported}
                                                                OPTIONAL,
   -- R1 24-1a: Basic FR2-2 UL support
   ul-FR2-2-SCS-120kHz-r17 ENUMERATED {supported}
                                                                OPTIONAL,
   -- R1 24-2: 120KHz SSB support for initial access in FR2-2
   initialAccessSSB-120kHz-r17 ENUMERATED {supported}
                                                                OPTIONAL,
   -- R1 24-1b: Wideband PRACH for 120 kHz in FR2-2
   OPTIONAL,
```

```
-- R1 24-1c: Multi-RB support PUCCH format 0/1/4 for 120 kHz in FR2-2
multiRB-PUCCH-SCS-120kHz-r17
                                        ENUMERATED {supported}
                                                                           OPTIONAL.
-- R1 24-1d: Multiple PDSCH scheduling by single DCI for 120kHz in FR2-2
multiPDSCH-SingleDCI-FR2-2-SCS-120kHz-r17 ENUMERATED {supported}
                                                                           OPTIONAL.
-- R1 24-1e: Multiple PUSCH scheduling by single DCI for 120kHz in FR2-2
multiPUSCH-SingleDCI-FR2-2-SCS-120kHz-r17 ENUMERATED {supported}
                                                                           OPTIONAL,
-- R1 24-4: 480KHz SCS support for DL
dl-FR2-2-SCS-480kHz-r17
                                        ENUMERATED {supported}
                                                                           OPTIONAL,
-- R1 24-4a: 480KHz SCS support for UL
                                        ENUMERATED {supported}
ul-FR2-2-SCS-480kHz-r17
                                                                           OPTIONAL,
-- R1 24-3: 480KHz SSB support for initial access in FR2-2
                                        ENUMERATED {supported}
initialAccessSSB-480kHz-r17
                                                                           OPTIONAL,
-- R1 24-4b: Wideband PRACH for 480 kHz in FR2-2
widebandPRACH-SCS-480kHz-r17
                                        ENUMERATED {supported}
                                                                           OPTIONAL.
-- R1 24-4c: Multi-RB support PUCCH format 0/1/4 for 480 kHz in FR2-2
multiRB-PUCCH-SCS-480kHz-r17
                                        ENUMERATED {supported}
                                                                           OPTIONAL,
-- R1 24-4f: Enhanced PDCCH monitoring for 480KHz in FR2-2
enhancedPDCCH-monitoringSCS-480kHz-r17 ENUMERATED {supported}
                                                                           OPTIONAL,
-- R1 24-5: 960KHz SCS support for DL
dl-FR2-2-SCS-960kHz-r17
                                         ENUMERATED {supported}
                                                                           OPTIONAL.
-- R1 24-5a: 960KHz SCS support for UL
                                        ENUMERATED {supported}
ul-FR2-2-SCS-960kHz-r17
                                                                           OPTIONAL,
-- R1 24-5c: Multi-RB support PUCCH format 0/1/4 for 960 kHz in FR2-2
                                        ENUMERATED {supported}
multiRB-PUCCH-SCS-960kHz-r17
                                                                           OPTIONAL,
-- R1 24-5f: Enhanced PDCCH monitoring for 960KHz in FR2-2
enhancedPDCCH-monitoringSCS-960kHz-r17 SEOUENCE {
    pdcch-monitoring4-1-r17
                                                                           OPTIONAL,
                                             ENUMERATED {supported}
   pdcch-monitoring4-2-r17
                                             ENUMERATED {supported}
                                                                           OPTIONAL,
                                             ENUMERATED {supported}
    pdcch-monitoring8-4-r17
                                                                           OPTIONAL
                                                                           OPTIONAL,
-- R1 24-6: Type 1 channel access procedure in uplink for FR2-2 with shared spectrum channel access
type1-ChannelAccess-FR2-2-r17
                                        ENUMERATED {supported}
                                                                           OPTIONAL,
-- R1 24-7: Type 2 channel access procedure in uplink for FR2-2 with shared spectrum channel access
type2-ChannelAccess-FR2-2-r17
                                        ENUMERATED {supported}
                                                                           OPTIONAL,
-- R1 24-10: Reduced beam switching time delay
reduced-BeamSwitchTiming-FR2-2-r17
                                        ENUMERATED {supported}
                                                                           OPTIONAL,
-- R1 24-8: 32 DL HARQ processes for FR 2-2
support32-DL-HARO-ProcessPerSCS-r17
                                        SEOUENCE {
    scs-120kHz-r17
                                             ENUMERATED {supported}
                                                                           OPTIONAL,
    scs-480kHz-r17
                                             ENUMERATED {supported}
                                                                           OPTIONAL,
    scs-960kHz-r17
                                             ENUMERATED {supported}
                                                                           OPTIONAL
                                                                           OPTIONAL,
-- R1 24-9: 32 UL HARQ processes for FR 2-2
support32-UL-HARO-ProcessPerSCS-r17
                                        SEOUENCE {
    scs-120kHz-r17
                                             ENUMERATED {supported}
                                                                           OPTIONAL,
    scs-480kHz-r17
                                             ENUMERATED {supported}
                                                                           OPTIONAL,
    scs-960kHz-r17
                                             ENUMERATED {supported}
                                                                           OPTIONAL
                                                                           OPTIONAL,
. . . .
[ [
-- R4 15-1: 640AM for PUSCH for FR2-2
modulation64-QAM-PUSCH-FR2-2-r17
                                             ENUMERATED {supported}
                                                                           OPTIONAL
11
```

```
-- TAG-FR2-2-ACCESSPARAMSPERBAND-STOP
-- ASN1STOP
```

HighSpeedParameters

The IE *HighSpeedParameters* is used to convey capabilities related to high speed scenarios.

HighSpeedParameters information element

```
-- ASN1START
-- TAG-HIGHSPEEDPARAMETERS-START
HighSpeedParameters-r16 ::= SEQUENCE {
   measurementEnhancement-r16
                                     ENUMERATED {supported}
                                                              OPTIONAL,
                                     ENUMERATED {supported}
    demodulationEnhancement-r16
                                                              OPTIONAL
HighSpeedParameters-v1650 ::= CHOICE {
    intraNR-MeasurementEnhancement-r16
                                             ENUMERATED {supported},
    interRAT-MeasurementEnhancement-r16
                                             ENUMERATED {supported}
HighSpeedParameters-v1700 ::= SEQUENCE {
    -- R4 18-1: Enhanced RRM requirements specified for CA for FR1 HST
   measurementEnhancementCA-r17
                                            ENUMERATED {supported}
                                                                    OPTIONAL,
    -- R4 18-2: Enhanced RRM requirements specified for inter-frequency measurement in connected mode for FR1 HST
    measurementEnhancementInterFreq-r17
                                            ENUMERATED {supported}
                                                                     OPTIONAL
-- TAG-HIGHSPEEDPARAMETERS-STOP
-- ASN1STOP
```

IMS-Parameters

The IE *IMS-Parameters* is used to convey capabilities related to IMS.

IMS-Parameters information element

```
IMS-Parameters-v1700 ::= SEQUENCE {
    ims-ParametersFR2-2-r17
                              IMS-ParametersFR2-2-r17
                                                                      OPTIONAL
IMS-ParametersCommon ::= SEQUENCE {
    voiceOverEUTRA-5GC
                                        ENUMERATED {supported}
                                                                               OPTIONAL,
    . . . ,
    11
                                        ENUMERATED {supported}
    voiceOverSCG-BearerEUTRA-5GC
                                                                               OPTIONAL
    ] ]
    voiceFallbackIndicationEPS-r16
                                         ENUMERATED {supported}
                                                                                   OPTIONAL
    11
IMS-ParametersFRX-Diff ::= SEQUENCE {
                               ENUMERATED {supported}
    voiceOverNR
                                                                      OPTIONAL,
IMS-ParametersFR2-2-r17 ::= SEQUENCE {
                                ENUMERATED {supported}
    voiceOverNR-r17
                                                                      OPTIONAL,
-- TAG-IMS-PARAMETERS-STOP
-- ASN1STOP
```

InterRAT-Parameters

The IE *InterRAT-Parameters* is used convey UE capabilities related to the other RATs.

InterRAT-Parameters information element

```
-- ASN1START
-- TAG-INTERRAT-PARAMETERS-START
InterRAT-Parameters ::=
                                     SEQUENCE {
                                         EUTRA-Parameters
                                                                         OPTIONAL,
    eutra
    . . . ,
    [ [
    utra-FDD-r16
                                        UTRA-FDD-Parameters-r16
                                                                         OPTIONAL
EUTRA-Parameters ::=
                                    SEQUENCE
                                    SEQUENCE (SIZE (1..maxBandsEUTRA)) OF FreqBandIndicatorEUTRA,
    supportedBandListEUTRA
    eutra-ParametersCommon
                                        EUTRA-ParametersCommon
                                                                                                      OPTIONAL,
    eutra-ParametersXDD-Diff
                                        EUTRA-ParametersXDD-Diff
                                                                                                      OPTIONAL,
```

```
EUTRA-ParametersCommon ::=
                               SEOUENCE {
   mfbi-EUTRA
                                       ENUMERATED {supported}
                                                                       OPTIONAL,
   modifiedMPR-BehaviorEUTRA
                                       BIT STRING (SIZE (32))
                                                                       OPTIONAL,
                                       ENUMERATED {supported}
   multiNS-Pmax-EUTRA
                                                                       OPTIONAL,
    rs-SINR-MeasEUTRA
                                       ENUMERATED {supported}
                                                                       OPTIONAL,
    ] ]
                                       ENUMERATED {supported}
    ne-DC
                                                                       OPTIONAL
    ]],
    ] ]
                                       ENUMERATED {supported}
    nr-HO-ToEN-DC-r16
                                                                       OPTIONAL
    11
EUTRA-ParametersXDD-Diff ::=
                                    SEOUENCE {
    rsrqMeasWidebandEUTRA
                                       ENUMERATED {supported}
                                                                       OPTIONAL,
    . . .
UTRA-FDD-Parameters-r16 ::=
                                          SEQUENCE {
                                              SEQUENCE (SIZE (1..maxBandsUTRA-FDD-r16)) OF SupportedBandUTRA-FDD-r16,
    supportedBandListUTRA-FDD-r16
SupportedBandUTRA-FDD-r16 ::=
                                       ENUMERATED {
                                           bandI, bandII, bandIII, bandIV, bandV, bandVI,
                                           bandVII, bandVIII, bandIX, bandXI,
                                           bandXII, bandXIII, bandXIV, bandXVI, bandXVI,
                                           bandXVII, bandXVIII, bandXIX, bandXX,
                                           bandXXI, bandXXII, bandXXIV,
                                           bandXXV, bandXXVI, bandXXVII, bandXXVIII,
                                           bandXXIX, bandXXXI, bandXXXII}
-- TAG-INTERRAT-PARAMETERS-STOP
-- ASN1STOP
```

MAC-Parameters

The IE MAC-Parameters is used to convey capabilities related to MAC.

MAC-Parameters information element

```
MAC-Parameters-v1610 ::= SEQUENCE {
    mac-ParametersFRX-Diff-r16
                                     MAC-ParametersFRX-Diff-r16 OPTIONAL
MAC-Parameters-v1700 ::= SEQUENCE {
    mac-ParametersFR2-2-r17
                                     MAC-ParametersFR2-2-r17
                                                                  OPTIONAL
                             SEOUENCE {
MAC-ParametersCommon ::=
    lcp-Restriction
                                             ENUMERATED {supported}
                                                                          OPTIONAL,
    dummy
                                             ENUMERATED {supported}
                                                                          OPTIONAL,
    lch-ToSCellRestriction
                                             ENUMERATED {supported}
                                                                          OPTIONAL,
    . . . .
    ΓΓ
    recommendedBitRate
                                             ENUMERATED {supported}
                                                                          OPTIONAL,
    recommendedBitRateOuery
                                             ENUMERATED {supported}
                                                                          OPTIONAL
    ]],
    [ [
    recommendedBitRateMultiplier-r16
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    preEmptiveBSR-r16
                                              ENUMERATED
                                                          {supported}
                                                                          OPTIONAL,
                                              ENUMERATED {supported}
    autonomousTransmission-r16
                                                                          OPTIONAL,
    lch-PriorityBasedPrioritization-r16
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    lch-ToConfiguredGrantMapping-r16
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    lch-ToGrantPriorityRestriction-r16
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    singlePHR-P-r16
                                              ENUMERATED
                                                         {supported}
                                                                          OPTIONAL,
    ul-LBT-FailureDetectionRecovery-r16
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    -- R4 8-1: MPE
    tdd-MPE-P-MPR-Reporting-r16
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    lcid-ExtensionIAB-r16
                                              ENUMERATED {supported}
                                                                          OPTIONAL
    11,
    ] ]
    spCell-BFR-CBRA-r16
                                              ENUMERATED {supported}
                                                                          OPTIONAL
    ]],
    11
                                              ENUMERATED {supported}
    srs-ResourceId-Ext-r16
                                                                          OPTIONAL
    11.
    ] ]
    enhancedUuDRX-forSidelink-r17
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    --27-10: Support of UL MAC CE based MG activation request for PRS measurements
                                              ENUMERATED {supported}
    mg-ActivationRequestPRS-Meas-r17
                                                                          OPTIONAL,
    --27-11: Support of DL MAC CE based MG activation request for PRS measurements
    mg-ActivationCommPRS-Meas-r17
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    intraCG-Prioritization-r17
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    iointPrioritizationCG-Retx-Timer-r17
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    survivalTime-r17
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    lcg-ExtensionIAB-r17
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    harq-FeedbackDisabled-r17
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    uplink-Harg-ModeB-r17
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    sr-TriggeredBy-TA-Report-r17
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    extendedDRX-CycleInactive-r17
                                              ENUMERATED {supported}
                                                                          OPTIONAL,
    simultaneousSR-PUSCH-DiffPUCCH-groups-r17 ENUMERATED {supported}
                                                                          OPTIONAL,
    lastTransmissionUL-r17
                                              ENUMERATED {supported}
                                                                          OPTIONAL
    ]]
```

```
MAC-ParametersFRX-Diff-r16 ::= SEOUENCE {
    directMCG-SCellActivation-r16
                                             ENUMERATED {supported}
                                                                          OPTIONAL,
    directMCG-SCellActivationResume-r16
                                             ENUMERATED
                                                         {supported}
                                                                          OPTIONAL,
    directSCG-SCellActivation-r16
                                             ENUMERATED {supported}
                                                                          OPTIONAL,
    directSCG-SCellActivationResume-r16
                                             ENUMERATED {supported}
                                                                          OPTIONAL,
    -- R1 19-1: DRX Adaptation
    drx-Adaptation-r16
                                 SEOUENCE {
        non-SharedSpectrumChAccess-r16
                                             MinTimeGap-r16
                                                                          OPTIONAL.
        sharedSpectrumChAccess-r16
                                             MinTimeGap-r16
                                                                          OPTIONAL
                                                                          OPTIONAL,
    . . .
MAC-ParametersFR2-2-r17 ::= SEQUENCE {
                                                        {supported}
    directMCG-SCellActivation-r17
                                                                          OPTIONAL,
                                             ENUMERATED
    directMCG-SCellActivationResume-r17
                                             ENUMERATED
                                                         {supported}
                                                                          OPTIONAL,
    directSCG-SCellActivation-r17
                                             ENUMERATED {supported}
                                                                          OPTIONAL,
    directSCG-SCellActivationResume-r17
                                             ENUMERATED {supported}
                                                                          OPTIONAL,
    drx-Adaptation-r17
                              SEQUENCE {
        non-SharedSpectrumChAccess-r17
                                             MinTimeGapFR2-2-r17
                                                                          OPTIONAL,
        sharedSpectrumChAccess-r17
                                             MinTimeGapFR2-2-r17
                                                                          OPTIONAL
                                                                          OPTIONAL.
MAC-ParametersXDD-Diff ::= SEQUENCE {
    skipUplinkTxDynamic
                                             ENUMERATED
                                                         {supported}
                                                                         OPTIONAL,
                                                         {supported}
    logicalChannelSR-DelayTimer
                                             ENUMERATED
                                                                         OPTIONAL,
    longDRX-Cycle
                                             ENUMERATED
                                                         {supported}
                                                                         OPTIONAL,
    shortDRX-Cycle
                                                         {supported}
                                                                         OPTIONAL,
                                             ENUMERATED
    multipleSR-Configurations
                                             ENUMERATED
                                                         {supported}
                                                                         OPTIONAL,
    multipleConfiguredGrants
                                             ENUMERATED {supported}
                                                                         OPTIONAL,
    . . . ,
    ] ]
    secondaryDRX-Group-r16
                                             ENUMERATED {supported}
                                                                         OPTIONAL
    ]],
    [ [
    enhancedSkipUplinkTxDynamic-r16
                                             ENUMERATED {supported}
                                                                         OPTIONAL,
    enhancedSkipUplinkTxConfigured-r16
                                             ENUMERATED {supported}
                                                                         OPTIONAL
    11
MinTimeGap-r16 ::=
                       SEOUENCE {
    scs-15kHz-r16
                                           ENUMERATED {sl1, sl3}
                                                                         OPTIONAL,
    scs-30kHz-r16
                                           ENUMERATED {sl1, sl6}
                                                                         OPTIONAL.
    scs-60kHz-r16
                                           ENUMERATED {sl1, sl12}
                                                                         OPTIONAL,
    scs-120kHz-r16
                                           ENUMERATED {s12, s124}
                                                                         OPTIONAL
MinTimeGapFR2-2-r17 ::= SEQUENCE {
    scs-120kHz-r17
                                           ENUMERATED {sl2, sl24}
                                                                         OPTIONAL,
    scs-480kHz-r17
                                           ENUMERATED {sl8, sl96}
                                                                         OPTIONAL,
```

```
scs-960kHz-r17 ENUMERATED {sl16, sl192} OPTIONAL }

-- TAG-MAC-PARAMETERS-STOP
-- ASN1STOP
```

MeasAndMobParameters

The IE *MeasAndMobParameters* is used to convey UE capabilities related to measurements for radio resource management (RRM), radio link monitoring (RLM) and mobility (e.g. handover).

Meas And MobParameters information element

```
-- ASN1START
-- TAG-MEASANDMOBPARAMETERS-START
                                             SEQUENCE {
MeasAndMobParameters ::=
    measAndMobParametersCommon
                                             MeasAndMobParametersCommon
                                                                                       OPTIONAL.
    measAndMobParametersXDD-Diff
                                                 MeasAndMobParametersXDD-Diff
                                                                                       OPTIONAL,
    measAndMobParametersFRX-Diff
                                                 MeasAndMobParametersFRX-Diff
                                                                                       OPTIONAL
MeasAndMobParameters-v1700 ::=
                                         SEOUENCE {
                                             MeasAndMobParametersFR2-2-r17
    measAndMobParametersFR2-2-r17
                                                                                       OPTIONAL
                                         SEQUENCE {
MeasAndMobParametersCommon ::=
                                                                                       OPTIONAL,
    supportedGapPattern
                                             BIT STRING (SIZE (22))
    ssb-RLM
                                             ENUMERATED {supported}
                                                                                       OPTIONAL,
    ssb-AndCSI-RS-RLM
                                             ENUMERATED {supported}
                                                                                       OPTIONAL,
    [ [
                                                         {supported}
    eventB-MeasAndReport
                                             ENUMERATED
                                                                                       OPTIONAL,
    handoverFDD-TDD
                                             ENUMERATED
                                                         {supported}
                                                                                       OPTIONAL,
    eutra-CGI-Reporting
                                             ENUMERATED {supported}
                                                                                       OPTIONAL,
    nr-CGI-Reporting
                                             ENUMERATED {supported}
                                                                                       OPTIONAL
    ]],
    [ [
                                             ENUMERATED {supported}
    independentGapConfig
                                                                                       OPTIONAL,
    periodicEUTRA-MeasAndReport
                                             ENUMERATED
                                                         {supported}
                                                                                       OPTIONAL,
    handoverFR1-FR2
                                             ENUMERATED {supported}
                                                                                       OPTIONAL,
    maxNumberCSI-RS-RRM-RS-SINR
                                             ENUMERATED {n4, n8, n16, n32, n64, n96} OPTIONAL
    ]],
    ] ]
    nr-CGI-Reporting-ENDC
                                             ENUMERATED {supported}
                                                                                       OPTIONAL
    ]],
    ] ]
    eutra-CGI-Reporting-NEDC
                                             ENUMERATED
                                                         {supported}
                                                                                       OPTIONAL,
    eutra-CGI-Reporting-NRDC
                                                         {supported}
                                             ENUMERATED
                                                                                       OPTIONAL,
    nr-CGI-Reporting-NEDC
                                             ENUMERATED {supported}
                                                                                       OPTIONAL,
    nr-CGI-Reporting-NRDC
                                             ENUMERATED {supported}
                                                                                       OPTIONAL
```

```
]],
П
reportAddNeighMeasForPeriodic-r16
                                         ENUMERATED {supported}
                                                                                   OPTIONAL.
condHandoverParametersCommon-r16
                                         SEOUENCE {
   condHandoverFDD-TDD-r16
                                             ENUMERATED {supported}
                                                                                   OPTIONAL.
                                             ENUMERATED {supported}
   condHandoverFR1-FR2-r16
                                                                                   OPTIONAL
                                                                                   OPTIONAL,
nr-NeedForGap-Reporting-r16
                                         ENUMERATED {supported}
                                                                                   OPTIONAL.
supportedGapPattern-NRonly-r16
                                         BIT STRING (SIZE (10))
                                                                                   OPTIONAL,
supportedGapPattern-NRonly-NEDC-r16
                                         ENUMERATED
                                                     {supported}
                                                                                   OPTIONAL.
maxNumberCLI-RSSI-r16
                                         ENUMERATED
                                                     {n8, n16, n32, n64}
                                                                                   OPTIONAL,
maxNumberCLI-SRS-RSRP-r16
                                         ENUMERATED {n4, n8, n16, n32}
                                                                                   OPTIONAL,
maxNumberPerSlotCLI-SRS-RSRP-r16
                                         ENUMERATED {n2, n4, n8}
                                                                                   OPTIONAL.
mfbi-IAB-r16
                                         ENUMERATED
                                                     {supported}
                                                                                   OPTIONAL,
dummy
                                         ENUMERATED
                                                     {supported}
                                                                                   OPTIONAL,
nr-CGI-Reporting-NPN-r16
                                         ENUMERATED
                                                     {supported}
                                                                                   OPTIONAL,
idleInactiveEUTRA-MeasReport-r16
                                         ENUMERATED
                                                     {supported
                                                                                   OPTIONAL,
idleInactive-ValidityArea-r16
                                                     {supported}
                                         ENUMERATED
                                                                                   OPTIONAL,
eutra-AutonomousGaps-r16
                                         ENUMERATED
                                                     {supported}
                                                                                   OPTIONAL,
eutra-AutonomousGaps-NEDC-r16
                                         ENUMERATED
                                                    {supported}
                                                                                   OPTIONAL,
eutra-AutonomousGaps-NRDC-r16
                                         ENUMERATED {supported}
                                                                                   OPTIONAL,
                                         ENUMERATED {supported}
pcellT312-r16
                                                                                   OPTIONAL,
supportedGapPattern-r16
                                         BIT STRING (SIZE (2))
                                                                                   OPTIONAL
11,
] ]
-- R4 19-2 Concurrent measurement gaps
                                         CHOICE {
concurrentMeasGap-r17
    concurrentPerUE-OnlyMeasGap-r17
                                             ENUMERATED {supported},
                                             ENUMERATED {supported}
    concurrentPerUE-PerFRCombMeasGap-r17
                                                                                   OPTIONAL,
-- R4 19-1 Network controlled small gap (NCSG)
                                         ENUMERATED {supported}
nr-NeedForGapNCSG-Reporting-r17
                                                                                   OPTIONAL,
eutra-NeedForGapNCSG-Reporting-r17
                                         ENUMERATED {supported}
                                                                                   OPTIONAL,
-- R4 19-1-1 per FR Network controlled small gap (NCSG)
ncsq-MeasGapPerFR-r17
                                         ENUMERATED {supported}
                                                                                   OPTIONAL.
-- R4 19-1-2 Network controlled small gap (NCSG) supported patterns
                                         BIT STRING (SIZE(24))
ncsg-MeasGapPatterns-r17
                                                                                   OPTIONAL,
-- R4 19-1-3 Network controlled small gap (NCSG) supported NR-only patterns
                                         BIT STRING (SIZE(24))
ncsq-MeasGapNR-Patterns-r17
                                                                                   OPTIONAL,
-- R4 19-3-2 pre-configured measurement gap
preconfiguredUE-AutonomousMeasGap-r17
                                         ENUMERATED {supported}
                                                                                   OPTIONAL,
-- R4 19-3-1 pre-configured measurement gap
preconfiguredNW-ControlledMeasGap-r17
                                         ENUMERATED {supported}
                                                                                   OPTIONAL,
handoverFR1-FR2-2-r17
                                         ENUMERATED
                                                     {supported}
                                                                                   OPTIONAL,
handoverFR2-1-FR2-2-r17
                                         ENUMERATED
                                                    {supported}
                                                                                   OPTIONAL.
-- RAN4 14-1: per-FR MG for PRS measurement
independentGapConfigPRS-r17
                                         ENUMERATED {supported}
                                                                                   OPTIONAL.
rrm-RelaxationRRC-ConnectedRedCap-r17
                                         ENUMERATED {supported}
                                                                                   OPTIONAL,
-- R4 25-3: Parallel measurements with multiple measurement gaps
parallelMeasurementGap-r17
                                         ENUMERATED {n2}
                                                                                   OPTIONAL,
condHandoverWithSCG-NRDC-r17
                                         ENUMERATED
                                                     {supported}
                                                                                   OPTIONAL,
qNB-ID-LengthReporting-r17
                                         ENUMERATED
                                                     {supported}
                                                                                   OPTIONAL,
gNB-ID-LengthReporting-ENDC-r17
                                                     {supported}
                                         ENUMERATED
                                                                                   OPTIONAL,
gNB-ID-LengthReporting-NEDC-r17
                                         ENUMERATED {supported}
                                                                                   OPTIONAL,
```

```
qNB-ID-LengthReporting-NRDC-r17
                                            ENUMERATED {supported}
                                                                                     OPTIONAL,
    qNB-ID-LengthReporting-NPN-r17
                                            ENUMERATED {supported}
                                                                                     OPTIONAL
    11.
    ] ]
    -- R4 25-1: Parallel measurements on multiple SMTC-s for a single frequency carrier
    parallelSMTC-r17
                                            ENUMERATED {n4}
                                                                                     OPTIONAL,
    -- R4 19-2-1 Concurrent measurement gaps for EUTRA
    concurrentMeasGapEUTRA-r17
                                            ENUMERATED {supported}
                                                                                     OPTIONAL.
    OPTIONAL.
    -- R4 19-1-4 Network controlled small gap (NCSG) performing measurement based on flagderiveSSB-IndexFromCell-inter
    ncsg-SymbolLevelScheduleRestrictionInter-r17 ENUMERATED {supported}
                                                                                     OPTIONAL
    ]],
    11
    eventD1-MeasReportTrigger-r17
                                            ENUMERATED {supported}
                                                                                     OPTIONAL,
    independentGapConfig-maxCC-r17
                                            SEOUENCE {
        fr1-Only-r17
                                                INTEGER (1..32)
                                                                                     OPTIONAL,
        fr2-Only-r17
                                                INTEGER (1..32)
                                                                                     OPTIONAL,
        fr1-AndFR2-r17
                                                INTEGER (1..32)
                                                                                     OPTIONAL
                                                                                     OPTIONAL
    11
MeasAndMobParametersXDD-Diff ::=
                                        SEQUENCE {
    intraAndInterF-MeasAndReport
                                            ENUMERATED {supported}
                                                                                     OPTIONAL.
    eventA-MeasAndReport
                                            ENUMERATED {supported}
                                                                                     OPTIONAL,
    . . . ,
    ] ]
    handoverInterF
                                            ENUMERATED
                                                       {supported}
                                                                                     OPTIONAL,
    handoverLTE-EPC
                                            ENUMERATED
                                                       {supported}
                                                                                     OPTIONAL,
    handoverLTE-5GC
                                            ENUMERATED {supported}
                                                                                     OPTIONAL
    11,
    ] ]
    sftd-MeasNR-Neigh
                                            ENUMERATED {supported}
                                                                                     OPTIONAL.
    sftd-MeasNR-Neigh-DRX
                                            ENUMERATED {supported}
                                                                                     OPTIONAL
    ]],
    ] ]
                                            ENUMERATED {supported}
                                                                                     OPTIONAL
    dummy
    ]]
MeasAndMobParametersFRX-Diff ::=
                                            SEOUENCE {
    ss-SINR-Meas
                                                ENUMERATED
                                                           {supported}
                                                                                     OPTIONAL,
                                                            {supported}
    csi-RSRP-AndRSRQ-MeasWithSSB
                                                ENUMERATED
                                                                                     OPTIONAL,
    csi-RSRP-AndRSRQ-MeasWithoutSSB
                                                            {supported}
                                                                                     OPTIONAL,
                                                ENUMERATED
                                                            {supported}
    csi-SINR-Meas
                                                ENUMERATED
                                                                                     OPTIONAL.
    csi-RS-RLM
                                                ENUMERATED
                                                           {supported}
                                                                                     OPTIONAL,
    . . . ,
    ] ]
    handoverInterF
                                                ENUMERATED
                                                            {supported}
                                                                                     OPTIONAL.
                                                ENUMERATED
    handoverLTE-EPC
                                                            {supported}
                                                                                     OPTIONAL,
    handoverLTE-5GC
                                                ENUMERATED {supported}
                                                                                     OPTIONAL
    ]],
    ] ]
                                                ENUMERATED {n2, n4, n6, n8}
    maxNumberResource-CSI-RS-RLM
                                                                                     OPTIONAL
```

```
]],
    ] ]
    simultaneousRxDataSSB-DiffNumerology
                                                 ENUMERATED {supported}
                                                                                       OPTIONAL
    ] ]
                                                 ENUMERATED {supported}
    nr-AutonomousGaps-r16
                                                                                       OPTIONAL,
    nr-AutonomousGaps-ENDC-r16
                                                 ENUMERATED
                                                             {supported}
                                                                                       OPTIONAL,
    nr-AutonomousGaps-NEDC-r16
                                                 ENUMERATED
                                                             {supported}
                                                                                       OPTIONAL.
    nr-AutonomousGaps-NRDC-r16
                                                 ENUMERATED
                                                             {supported}
                                                                                       OPTIONAL,
    dummy
                                                 ENUMERATED
                                                              {supported}
                                                                                       OPTIONAL,
    cli-RSSI-Meas-r16
                                                             {supported}
                                                 ENUMERATED
                                                                                       OPTIONAL,
    cli-SRS-RSRP-Meas-r16
                                                 ENUMERATED {supported}
                                                                                       OPTIONAL,
    interFrequencyMeas-NoGap-r16
                                                 ENUMERATED {supported}
                                                                                       OPTIONAL,
    simultaneousRxDataSSB-DiffNumerology-Inter-r16 ENUMERATED {supported}
                                                                                       OPTIONAL,
    idleInactiveNR-MeasReport-r16
                                                 ENUMERATED {supported}
                                                                                       OPTIONAL,
    -- R4 6-2: Support of beam level Early Measurement Reporting
    idleInactiveNR-MeasBeamReport-r16
                                                 ENUMERATED {supported}
                                                                                       OPTIONAL
    ]],
    [ [
    increasedNumberofCSIRSPerMO-r16
                                                 ENUMERATED {supported}
                                                                                       OPTIONAL
    11
MeasAndMobParametersFR2-2-r17 ::=
                                             SEQUENCE {
    handoverInterF-r17
                                                             {supported}
                                                 ENUMERATED
                                                                                       OPTIONAL,
    handoverLTE-EPC-r17
                                                 ENUMERATED
                                                             {supported}
                                                                                       OPTIONAL,
    handoverLTE-5GC-r17
                                                             {supported}
                                                 ENUMERATED
                                                                                       OPTIONAL,
    idleInactiveNR-MeasReport-r17
                                                 ENUMERATED {supported}
                                                                                       OPTIONAL,
-- TAG-MEASANDMOBPARAMETERS-STOP
-- ASN1STOP
```

MeasAndMobParametersMRDC

The IE MeasAndMobParametersMRDC is used to convey capability parameters related to RRM measurements and RRC mobility.

MeasAndMobParametersMRDC information element

```
-- ASN1START
-- TAG-MEASANDMOBPARAMETERSMRDC-START
MeasAndMobParametersMRDC ::=
                                        SEOUENCE {
    measAndMobParametersMRDC-Common
                                            MeasAndMobParametersMRDC-Common
                                                                                             OPTIONAL,
    measAndMobParametersMRDC-XDD-Diff
                                            MeasAndMobParametersMRDC-XDD-Diff
                                                                                             OPTIONAL,
    measAndMobParametersMRDC-FRX-Diff
                                            MeasAndMobParametersMRDC-FRX-Diff
                                                                                              OPTIONAL
MeasAndMobParametersMRDC-v1560 ::=
                                         SEOUENCE {
    measAndMobParametersMRDC-XDD-Diff-v1560
                                               MeasAndMobParametersMRDC-XDD-Diff-v1560
                                                                                             OPTIONAL
```

```
MeasAndMobParametersMRDC-v1610 ::=
                                         SEQUENCE {
    measAndMobParametersMRDC-Common-v1610
                                                MeasAndMobParametersMRDC-Common-v1610
                                                                                              OPTIONAL,
    interNR-MeasEUTRA-IAB-r16
                                                ENUMERATED {supported}
                                                                                               OPTIONAL
MeasAndMobParametersMRDC-v1700 ::=
                                         SEOUENCE {
    measAndMobParametersMRDC-Common-v1700
                                                MeasAndMobParametersMRDC-Common-v1700
                                                                                              OPTIONAL
MeasAndMobParametersMRDC-v1730 ::=
                                         SEQUENCE {
    measAndMobParametersMRDC-Common-v1730
                                           MeasAndMobParametersMRDC-Common-v1730
                                                                                               OPTIONAL
MeasAndMobParametersMRDC-Common ::=
                                         SEOUENCE {
    independentGapConfig
                                             ENUMERATED {supported}
                                                                                               OPTIONAL
MeasAndMobParametersMRDC-Common-v1610 ::=
                                             SEQUENCE {
    condPSCellChangeParametersCommon-r16
                                                 SEQUENCE {
        condPSCellChangeFDD-TDD-r16
                                                     ENUMERATED {supported}
                                                                                              OPTIONAL,
        condPSCellChangeFR1-FR2-r16
                                                     ENUMERATED {supported}
                                                                                              OPTIONAL
                                                                                               OPTIONAL.
    pscellT312-r16
                                                 ENUMERATED {supported}
                                                                                               OPTIONAL
MeasAndMobParametersMRDC-Common-v1700 ::=
                                             SEOUENCE {
    condPSCellChangeParameters-r17
        \verb|inter-SN-condPSCellChangeFDD-TDD-NRDC-r17| \\
                                                         ENUMERATED {supported}
                                                                                              OPTIONAL,
        inter-SN-condPSCellChangeFR1-FR2-NRDC-r17
                                                         ENUMERATED
                                                                     {supported
                                                                                               OPTIONAL.
        inter-SN-condPSCellChangeFDD-TDD-ENDC-r17
                                                                      supported
                                                                                              OPTIONAL,
                                                         ENUMERATED
        inter-SN-condPSCellChangeFR1-FR2-ENDC-r17
                                                         ENUMERATED
                                                                      supported
                                                                                              OPTIONAL,
        mn-InitiatedCondPSCellChange-FR1FDD-ENDC-r17
                                                         ENUMERATED
                                                                     {supported
                                                                                              OPTIONAL,
        mn-InitiatedCondPSCellChange-FR1TDD-ENDC-r17
                                                         ENUMERATED
                                                                      supported
                                                                                              OPTIONAL,
        mn-InitiatedCondPSCellChange-FR2TDD-ENDC-r17
                                                         ENUMERATED
                                                                      supported
                                                                                              OPTIONAL,
        sn-InitiatedCondPSCellChange-FR1FDD-ENDC-r17
                                                                     supported
                                                         ENUMERATED
                                                                                              OPTIONAL,
        sn-InitiatedCondPSCellChange-FR1TDD-ENDC-r17
                                                          ENUMERATED
                                                                      supported
                                                                                              OPTIONAL,
                                                                     {supported}
        sn-InitiatedCondPSCellChange-FR2TDD-ENDC-r17
                                                         ENUMERATED
                                                                                              OPTIONAL
                                                                                               OPTIONAL,
    condHandoverWithSCG-ENDC-r17
                                                          ENUMERATED {supported}
                                                                                               OPTIONAL,
    condHandoverWithSCG-NEDC-r17
                                                         ENUMERATED {supported}
                                                                                               OPTIONAL
MeasAndMobParametersMRDC-Common-v1730 ::= SEOUENCE {
    independentGapConfig-maxCC-r17
        fr1-Only-r17
                                                 INTEGER (1..32)
                                                                                               OPTIONAL.
        fr2-Only-r17
                                                 INTEGER (1..32)
                                                                                              OPTIONAL,
        fr1-AndFR2-r17
                                                 INTEGER (1..32)
                                                                                               OPTIONAL
MeasAndMobParametersMRDC-XDD-Diff ::=
    sftd-MeasPSCell
                                             ENUMERATED {supported}
                                                                                               OPTIONAL,
```

- *MIMO-Layer*s

The IE MIMO-Layers is used to convey the number of supported MIMO layers.

MIMO-Layers information element

```
-- ASN1START
-- TAG-MIMO-LAYERS-START

MIMO-LayersDL ::= ENUMERATED {twoLayers, fourLayers, eightLayers}

MIMO-LayersUL ::= ENUMERATED {oneLayer, twoLayers, fourLayers}

-- TAG-MIMO-LAYERS-STOP
-- ASN1STOP
```

MIMO-ParametersPerBand

The IE MIMO-ParametersPerBand is used to convey MIMO related parameters specific for a certain band (not per feature set or band combination).

MIMO-ParametersPerBand information element

```
-- ASN1START
-- TAG-MIMO-PARAMETERSPERBAND-START
MIMO-ParametersPerBand ::=
                                    SEQUENCE {
    tci-StatePDSCH
                                        SEQUENCE {
       maxNumberConfiguredTCI-StatesPerCC ENUMERATED {n4, n8, n16, n32, n64, n128}
                                                                                                                        OPTIONAL,
        maxNumberActiveTCI-PerBWP
                                            ENUMERATED {n1, n2, n4, n8}
                                                                                                                        OPTIONAL
                                                                                                                    OPTIONAL,
    additionalActiveTCI-StatePDCCH
                                                ENUMERATED {supported}
                                                                                                                    OPTIONAL,
    pusch-TransCoherence
                                                ENUMERATED {nonCoherent, partialCoherent, fullCoherent}
                                                                                                                    OPTIONAL,
    beamCorrespondenceWithoutUL-BeamSweeping
                                                ENUMERATED {supported}
                                                                                                                    OPTIONAL,
    periodicBeamReport
                                                ENUMERATED {supported}
                                                                                                                    OPTIONAL,
```

```
aperiodicBeamReport
                                             ENUMERATED {supported}
                                                                                                                  OPTIONAL,
sp-BeamReportPUCCH
                                             ENUMERATED
                                                        {supported}
                                                                                                                  OPTIONAL,
                                             ENUMERATED {supported}
sp-BeamReportPUSCH
                                                                                                                  OPTIONAL.
dummy1
                                             DummyG
                                                                                                                  OPTIONAL,
maxNumberRxBeam
                                             INTEGER (2..8)
                                                                                                                  OPTIONAL.
maxNumberRxTxBeamSwitchDL
                                             SEQUENCE {
    scs-15kHz
                                                 ENUMERATED {n4, n7, n14}
                                                                                                                      OPTIONAL,
   scs-30kHz
                                                 ENUMERATED {n4, n7, n14}
                                                                                                                      OPTIONAL,
   scs-60kHz
                                                 ENUMERATED {n4, n7, n14}
                                                                                                                      OPTIONAL,
    scs-120kHz
                                                 ENUMERATED {n4, n7, n14}
                                                                                                                      OPTIONAL,
    scs-240kHz
                                                 ENUMERATED {n4, n7, n14}
                                                                                                                      OPTIONAL
                                                                                                                  OPTIONAL,
maxNumberNonGroupBeamReporting
                                             ENUMERATED {n1, n2, n4}
                                                                                                                  OPTIONAL,
groupBeamReporting
                                             ENUMERATED {supported}
                                                                                                                  OPTIONAL.
uplinkBeamManagement
                                             SEOUENCE {
    maxNumberSRS-ResourcePerSet-BM
                                                 ENUMERATED {n2, n4, n8, n16},
                                                 INTEGER (1..8)
    maxNumberSRS-ResourceSet
                                                                                                                  OPTIONAL,
maxNumberCSI-RS-BFD
                                     INTEGER (1..64)
                                                                                                                  OPTIONAL,
maxNumberSSB-BFD
                                     INTEGER (1..64)
                                                                                                                  OPTIONAL,
maxNumberCSI-RS-SSB-CBD
                                     INTEGER (1..256)
                                                                                                                  OPTIONAL,
                                     ENUMERATED {supported}
dummy2
                                                                                                                  OPTIONAL,
                                     ENUMERATED {supported}
twoPortsPTRS-UL
                                                                                                                  OPTIONAL,
dummv5
                                     SRS-Resources
                                                                                                                  OPTIONAL,
dummy3
                                     INTEGER (1..4)
                                                                                                                  OPTIONAL,
beamReportTiming
                                     SEOUENCE {
    scs-15kHz
                                         ENUMERATED {sym2, sym4, sym8}
                                                                                                                      OPTIONAL,
    scs-30kHz
                                         ENUMERATED {sym4, sym8, sym14, sym28}
                                                                                                                      OPTIONAL,
   scs-60kHz
                                         ENUMERATED {sym8, sym14, sym28}
                                                                                                                      OPTIONAL,
    scs-120kHz
                                         ENUMERATED {sym14, sym28, sym56}
                                                                                                                      OPTIONAL
                                                                                                                  OPTIONAL,
ptrs-DensityRecommendationSetDL
                                    SEQUENCE {
   scs-15kHz
                                         PTRS-DensityRecommendationDL
                                                                                                                      OPTIONAL,
   scs-30kHz
                                         PTRS-DensityRecommendationDL
                                                                                                                      OPTIONAL,
   scs-60kHz
                                         PTRS-DensityRecommendationDL
                                                                                                                      OPTIONAL,
   scs-120kHz
                                         PTRS-DensityRecommendationDL
                                                                                                                      OPTIONAL
                                                                                                                  OPTIONAL,
ptrs-DensityRecommendationSetUL
                                     SEOUENCE {
    scs-15kHz
                                         PTRS-DensityRecommendationUL
                                                                                                                      OPTIONAL,
    scs-30kHz
                                         PTRS-DensityRecommendationUL
                                                                                                                      OPTIONAL,
    scs-60kHz
                                         PTRS-DensityRecommendationUL
                                                                                                                      OPTIONAL,
    scs-120kHz
                                         PTRS-DensityRecommendationUL
                                                                                                                      OPTIONAL
                                                                                                                  OPTIONAL,
dummy4
                                     DummyH
                                                                                                                  OPTIONAL,
aperiodicTRS
                                     ENUMERATED {supported}
                                                                                                                  OPTIONAL.
11
dummy6
                                     ENUMERATED {true}
                                                                                                                  OPTIONAL,
beamManagementSSB-CSI-RS
                                     BeamManagementSSB-CSI-RS
                                                                                                                  OPTIONAL,
beamSwitchTiming
                                     SEOUENCE {
    scs-60kHz
                                         ENUMERATED {sym14, sym28, sym48, sym224, sym336}
                                                                                                                      OPTIONAL,
    scs-120kHz
                                         ENUMERATED {sym14, sym28, sym48, sym224, sym336}
                                                                                                                      OPTIONAL
                                                                                                                  OPTIONAL,
                                     CodebookParameters
codebookParameters
                                                                                                                  OPTIONAL,
```

```
csi-RS-IM-ReceptionForFeedback
                                    CSI-RS-IM-ReceptionForFeedback
                                                                                                                OPTIONAL,
csi-RS-ProcFrameworkForSRS
                                    CSI-RS-ProcFrameworkForSRS
                                                                                                                OPTIONAL,
csi-ReportFramework
                                    CSI-ReportFramework
                                                                                                                OPTIONAL.
csi-RS-ForTracking
                                    CSI-RS-ForTracking
                                                                                                                OPTIONAL,
                                                                                                               OPTIONAL,
srs-AssocCSI-RS
                                    SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource
spatialRelations
                                    SpatialRelations
                                                                                                                OPTIONAL
11.
11
-- R1 16-2b-0: Support of default QCL assumption with two TCI states
                                    ENUMERATED {supported}
defaultOCL-TwoTCI-r16
                                                                                                                OPTIONAL,
codebookParametersPerBand-r16
                                    CodebookParameters-v1610
                                                                                                                OPTIONAL,
-- R1 16-1b-3: Support of PUCCH resource groups per BWP for simultaneous spatial relation update
simul-SpatialRelationUpdatePUCCHResGroup-r16 ENUMERATED {supported}
                                                                                                                OPTIONAL,
-- R1 16-1f: Maximum number of SCells configured for SCell beam failure recovery simultaneously
maxNumberSCellBFR-r16
                                                ENUMERATED {n1,n2,n4,n8}
                                                                                                                OPTIONAL,
-- R1 16-2c: Supports simultaneous reception with different Type-D for FR2 only
                                                ENUMERATED {supported}
simultaneousReceptionDiffTypeD-r16
                                                                                                                OPTIONAL,
-- R1 16-1a-1: SSB/CSI-RS for L1-SINR measurement
ssb-csirs-SINR-measurement-r16
                                    SEOUENCE {
   maxNumberSSB-CSIRS-OneTx-CMR-r16
                                        ENUMERATED {n8, n16, n32, n64},
   maxNumberCSI-IM-NZP-IMR-res-r16
                                        ENUMERATED {n8, n16, n32, n64},
   maxNumberCSIRS-2Tx-res-r16
                                        ENUMERATED {n0, n4, n8, n16, n32, n64},
   maxNumberSSB-CSIRS-res-r16
                                        ENUMERATED {n8, n16, n32, n64, n128},
    maxNumberCSI-IM-NZP-IMR-res-mem-r16 ENUMERATED {n8, n16, n32, n64, n128},
                                        ENUMERATED {one, three, oneAndThree},
    supportedCSI-RS-Density-CMR-r16
   maxNumberAperiodicCSI-RS-Res-r16
                                        ENUMERATED {n2, n4, n8, n16, n32, n64},
                                        ENUMERATED {ssbWithCSI-IM, ssbWithNZP-IMR, csirsWithNZP-IMR, csi-RSWithoutIMR} OPTIONAL
    supportedSINR-meas-r16
                                                                                                                OPTIONAL,
-- R1 16-1a-2: Non-group based L1-SINR reporting
nonGroupSINR-reporting-r16
                                        ENUMERATED {n1, n2, n4}
                                                                                                                OPTIONAL,
-- R1 16-1a-3: Non-group based L1-SINR reporting
groupSINR-reporting-r16
                                        ENUMERATED {supported}
                                                                                                                OPTIONAL,
multiDCI-multiTRP-Parameters-r16
                                        SEOUENCE {
    -- R1 16-2a-0: Overlapping PDSCHs in time and fully overlapping in frequency and time
   overlapPDSCHsFullyFregTime-r16
                                            INTEGER (1..2)
                                                                                                                OPTIONAL,
    -- R1 16-2a-1: Overlapping PDSCHs in time and partially overlapping in frequency and time
   overlapPDSCHsInTimePartiallyFreg-r16
                                            ENUMERATED {supported}
                                                                                                                OPTIONAL,
   -- R1 16-2a-2: Out of order operation for DL
   outOfOrderOperationDL-r16
                                            SEOUENCE {
                                                ENUMERATED {supported}
        supportPDCCH-ToPDSCH-r16
                                                                                                                OPTIONAL,
                                                ENUMERATED {supported}
       supportPDSCH-ToHARQ-ACK-r16
                                                                                                                OPTIONAL
                                                                                                                OPTIONAL.
    -- R1 16-2a-3: Out of order operation for UL
    outOfOrderOperationUL-r16
                                            ENUMERATED {supported}
                                                                                                                OPTIONAL,
    -- R1 16-2a-5: Separate CRS rate matching
   separateCRS-RateMatching-r16
                                            ENUMERATED {supported}
                                                                                                                OPTIONAL,
    -- R1 16-2a-6: Default OCL enhancement for multi-DCI based multi-TRP
                                            ENUMERATED {supported}
   defaultQCL-PerCORESETPoolIndex-r16
                                                                                                                OPTIONAL,
    -- R1 16-2a-7: Maximum number of activated TCI states
   maxNumberActivatedTCI-States-r16
                                            SEOUENCE {
       maxNumberPerCORESET-Pool-r16
                                                ENUMERATED {n1, n2, n4, n8},
```

```
ENUMERATED {n2, n4, n8, n16}
            maxTotalNumberAcrossCORESET-Pool-r16
                                                                                                                     OPTIONAL
                                                                                                                     OPTIONAL.
    singleDCI-SDM-scheme-Parameters-r16
                                                SEOUENCE {
        -- R1 16-2b-1b: Single-DCI based SDM scheme - Support of new DMRS port entry
        supportNewDMRS-Port-r16
                                                     ENUMERATED {supported1, supported2, supported3}
OPTIONAL.
        -- R1 16-2b-1a: Support of s-port DL PTRS
        supportTwoPortDL-PTRS-r16
                                                     ENUMERATED {supported}
                                                                                                                     OPTIONAL
                                                                                                                     OPTIONAL,
    -- R1 16-2b-2: Support of single-DCI based FDMSchemeA
                                                ENUMERATED {supported}
    supportFDM-SchemeA-r16
                                                                                                                     OPTIONAL,
    -- R1 16-2b-3a: Single-DCI based FDMSchemeB CW soft combining
    supportCodeWordSoftCombining-r16
                                                ENUMERATED {supported}
                                                                                                                     OPTIONAL.
    -- R1 16-2b-4: Single-DCI based TDMSchemeA
    supportTDM-SchemeA-r16
                                                ENUMERATED {kb3, kb5, kb10, kb20, noRestriction}
                                                                                                                     OPTIONAL,
    -- R1 16-2b-5: Single-DCI based inter-slot TDM
    supportInter-slotTDM-r16
                                                SEOUENCE {
        supportRepNumPDSCH-TDRA-r16
                                                     ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16},
       maxTBS-Size-r16
                                                     ENUMERATED {kb3, kb5, kb10, kb20, noRestriction},
        maxNumberTCI-states-r16
                                                     INTEGER (1..2)
                                                                                                                     OPTIONAL,
    -- R1 16-4: Low PAPR DMRS for PDSCH
    lowPAPR-DMRS-PDSCH-r16
                                                ENUMERATED {supported}
                                                                                                                     OPTIONAL,
    -- R1 16-6a: Low PAPR DMRS for PUSCH without transform precoding
    lowPAPR-DMRS-PUSCHwithoutPrecoding-r16
                                                ENUMERATED {supported}
                                                                                                                     OPTIONAL,
    -- R1 16-6b: Low PAPR DMRS for PUCCH
                                                ENUMERATED {supported}
    lowPAPR-DMRS-PUCCH-r16
                                                                                                                     OPTIONAL,
    -- R1 16-6c: Low PAPR DMRS for PUSCH with transform precoding & pi/2 BPSK
                                                ENUMERATED {supported}
   lowPAPR-DMRS-PUSCHwithPrecoding-r16
                                                                                                                     OPTIONAL,
    -- R1 16-7: Extension of the maximum number of configured aperiodic CSI report settings
    csi-ReportFrameworkExt-r16
                                                CSI-ReportFrameworkExt-r16
                                                                                                                     OPTIONAL,
    -- R1 16-3a, 16-3a-1, 16-3b, 16-3b-1, 16-8: Individual new codebook types
    codebookParametersAddition-r16
                                                CodebookParametersAddition-r16
                                                                                                                     OPTIONAL,
    -- R1 16-8: Mixed codebook types
    codebookComboParametersAddition-r16
                                                CodebookComboParametersAddition-r16
                                                                                                                     OPTIONAL,
    -- R4 8-2: SSB based beam correspondence
    beamCorrespondenceSSB-based-r16
                                                ENUMERATED {supported}
                                                                                                                     OPTIONAL,
    -- R4 8-3: CSI-RS based beam correspondence
    beamCorrespondenceCSI-RS-based-r16
                                                ENUMERATED {supported}
                                                                                                                     OPTIONAL,
    beamSwitchTiming-r16
                                                SEOUENCE {
        scs-60kHz-r16
                                                     ENUMERATED {sym224, sym336}
                                                                                                                     OPTIONAL,
        scs-120kHz-r16
                                                     ENUMERATED {sym224, sym336}
                                                                                                                     OPTIONAL
                                                                                                                     OPTIONAL
    11,
    Π
    -- R1 16-1a-4: Semi-persistent L1-SINR report on PUCCH
    semi-PersistentL1-SINR-Report-PUCCH-r16
                                                SEOUENCE {
        supportReportFormat1-20FDM-syms-r16
                                                     ENUMERATED {supported}
                                                                                                                 OPTIONAL,
                                                     ENUMERATED {supported}
        supportReportFormat4-140FDM-syms-r16
                                                                                                                 OPTIONAL
                                                                                                                 OPTIONAL,
    -- R1 16-1a-5: Semi-persistent L1-SINR report on PUSCH
    semi-PersistentL1-SINR-Report-PUSCH-r16
                                                ENUMERATED {supported}
                                                                                                                 OPTIONAL
    ]],
```

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-- R1 16-1h: Support of 64 configured PUCCH spatial relations
spatialRelations-v1640
                                           SEOUENCE {
   maxNumberConfiguredSpatialRelations-v1640 ENUMERATED {n96, n128, n160, n192, n224, n256, n288, n320}
                                                                                                          OPTIONAL.
-- R1 16-1i: Support of 64 configured candidate beam RSs for BFR
support64CandidateBeamRS-BFR-r16
                                           ENUMERATED {supported}
                                                                                                          OPTIONAL
11,
11
-- R1 16-2a-9: Interpretation of maxNumberMIMO-LayersPDSCH for multi-DCI based mTRP
maxMIMO-LayersForMulti-DCI-mTRP-r16
                                           ENUMERATED {supported}
                                                                                                         OPTIONAL
]],
11
supportedSINR-meas-v1670
                                           BIT STRING (SIZE (4))
                                                                                                         OPTIONAL
11.
Π
-- R1 23-8-5 Increased repetition for SRS
srs-increasedRepetition-r17
                                           ENUMERATED {supported}
                                                                                                         OPTIONAL,
-- R1 23-8-6 Partial frequency sounding of SRS
srs-partialFrequencySounding-r17
                                           ENUMERATED {supported}
                                                                                                          OPTIONAL,
-- R1 23-8-7 Start RB location hopping for partial frequency SRS
                                           ENUMERATED {supported}
srs-startRB-locationHoppingPartial-r17
                                                                                                         OPTIONAL,
-- R1 23-8-8 Comb-8 SRS
srs-combEight-r17
                                           ENUMERATED {supported}
                                                                                                         OPTIONAL,
-- R1 23-9-1 Basic Features of Further Enhanced Port-Selection Type II Codebook (FeType-II) per band information
codebookParametersfetype2-r17
                                           CodebookParametersfetype2-r17
                                                                                                         OPTIONAL,
-- R1 23-3-1-2a Two associated CSI-RS resources
mTRP-PUSCH-twoCSI-RS-r17
                                           ENUMERATED {supported}
                                                                                                         OPTIONAL,
-- R1 23-3-2 Multi-TRP PUCCH repetition scheme 1 (inter-slot)
                                           ENUMERATED {pf0-2, pf1-3-4, pf0-4}
mTRP-PUCCH-InterSlot-r17
                                                                                                         OPTIONAL,
-- R1 23-3-2b Cyclic mapping for multi-TRP PUCCH repetition
mTRP-PUCCH-CyclicMapping-r17
                                           ENUMERATED {supported}
                                                                                                         OPTIONAL,
-- R1 23-3-2c Second TPC field for multi-TRP PUCCH repetition
                                           ENUMERATED {supported}
mTRP-PUCCH-SecondTPC-r17
                                                                                                         OPTIONAL,
-- R1 23-5-2 MTRP BFR based on two BFD-RS set
mTRP-BFR-twoBFD-RS-Set-r17
                                           SEQUENCE {
                                               ENUMERATED {n1, n2},
   maxBFD-RS-resourcesPerSetPerBWP-r17
                                               INTEGER (1..9),
   maxBFR-r17
                                               ENUMERATED {n2, n3, n4}
    maxBFD-RS-resourcesAcrossSetsPerBWP-r17
                                                                                                          OPTIONAL,
-- R1 23-5-2a
                PUCCH-SR resources for MTRP BFRQ - Max number of PUCCH-SR resources for MTRP BFRQ per cell group
                                           ENUMERATED { n1, n2 }
mTRP-BFR-PUCCH-SR-perCG-r17
                                                                                                         OPTIONAL,
-- R1 23-5-2b Association between a BFD-RS resource set on SpCell and a PUCCH SR resource
                                           ENUMERATED {supported}
mTRP-BFR-association-PUCCH-SR-r17
                                                                                                          OPTIONAL,
-- R1 23-6-3 Simultaneous activation of two TCI states for PDCCH across multiple CCs (HST/URLLC)
sfn-SimulTwoTCI-AcrossMultiCC-r17
                                           ENUMERATED {supported}
                                                                                                          OPTIONAL.
-- R1 23-6-4 Default DL beam setup for SFN
sfn-DefaultDL-BeamSetup-r17
                                           ENUMERATED {supported}
                                                                                                         OPTIONAL,
-- R1 23-6-4a Default UL beam setup for SFN PDCCH(FR2 only)
                                           ENUMERATED {supported}
sfn-DefaultUL-BeamSetup-r17
                                                                                                         OPTIONAL,
-- R1 23-8-1 SRS triggering offset enhancement
srs-TriggeringOffset-r17
                                           ENUMERATED {n1, n2, n4}
                                                                                                         OPTIONAL,
-- R1 23-8-2 Triggering SRS only in DCI 0_1/0_2
srs-TriggeringDCI-r17
                                           ENUMERATED {supported}
                                                                                                          OPTIONAL,
```

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-- R1 23-9-5 Active CSI-RS resources and ports for mixed codebook types in any slot per band information
codebookComboParameterMixedType-r17
                                           CodebookComboParameterMixedType-r17
                                                                                                           OPTIONAL.
-- R1 23-1-1 Unified TCI [with joint DL/UL TCI update] for intra-cell beam management
unifiedJointTCI-r17
                                           SEQUENCE {
   maxConfiguredJointTCI-r17
                                               ENUMERATED {n8, n12, n16, n24, n32, n48, n64, n128},
   maxActivatedTCIAcrossCC-r17
                                               ENUMERATED {n1, n2, n4, n8, n16}
                                                                                                           OPTIONAL.
-- R1 23-1-1b Unified TCI with joint DL/UL TCI update for intra- and inter-cell beam management with more than one MAC-CE
unifiedJointTCI-multiMAC-CE-r17
                                           SEOUENCE {
   minBeamApplicationTime-r17
                                               ENUMERATED {n1, n2, n4, n7, n14, n28, n42, n56, n70, n84, n98, n112, n224, n336}
                                                                                                           OPTIONAL,
   maxNumMAC-CE-PerCC
                                                ENUMERATED {n2, n3, n4, n5, n6, n7, n8}
} OPTIONAL,
-- R1 23-1-1d Per BWP TCI state pool configuration for CA mode
unifiedJointTCI-perBWP-CA-r17
                                           ENUMERATED {supported}
                                                                                                           OPTIONAL,
-- R1 23-1-1e
              TCI state pool configuration with TCI pool sharing for CA mode
                                           ENUMERATED {n1,n2,n4,n8}
unifiedJointTCI-ListSharingCA-r17
                                                                                                           OPTIONAL,
-- R1 23-1-1f
                Common multi-CC TCI state ID update and activation
                                           ENUMERATED {supported}
unifiedJointTCI-commonMultiCC-r17
                                                                                                           OPTIONAL,
                Beam misalignment between the DL source RS in the TCI state
-- R1 23-1-1q
unifiedJointTCI-BeamAlignDLRS-r17
                                           ENUMERATED {supported}
                                                                                                           OPTIONAL,
-- R1 23-1-1h Association between TCI state and UL PC settings for PUCCH, PUSCH, and SRS
                                           ENUMERATED {supported}
unifiedJointTCI-PC-association-r17
                                                                                                           OPTIONAL,
-- R1 23-1-li Indication/configuration of R17 TCI states for aperiodic CSI-RS, PDCCH, PDSCH
unifiedJointTCI-Legacy-r17
                                           ENUMERATED {supported}
                                                                                                           OPTIONAL,
-- 23-1-1m
            Indication/configuration of R17 TCI states for SRS
unifiedJointTCI-Legacy-SRS-r17
                                           ENUMERATED {supported}
                                                                                                           OPTIONAL,
-- R1 23-1-1j Indication/configuration of R17 TCI states for CORESET #0
unifiedJointTCI-Legacy-CORESET0-r17
                                           ENUMERATED {supported}
                                                                                                           OPTIONAL,
-- R1 23-1-1c SCell BFR with unified TCI framework (NOTE; pre-requisite is empty)
unifiedJointTCI-SCellBFR-r17
                                           ENUMERATED {supported}
                                                                                                           OPTIONAL.
-- R1 23-1-1a Unified TCI with joint DL/UL TCI update for inter-cell beam management
unifiedJointTCI-InterCell-r17
                                           SEOUENCE {
   additionalMAC-CE-PerCC-r17
                                               ENUMERATED {n0, n1, n2, n4},
   additionalMAC-CE-AcrossCC-r17
                                               ENUMERATED {n0, n1, n2, n4}
                                                                                                           OPTIONAL.
-- R1 23-10-1 Unified TCI with separate DL/UL TCI update for intra-cell beam management
unifiedSeparateTCI-r17
                                           SEOUENCE {
   maxConfiguredDL-TCI-r17
                                                ENUMERATED {n4, n8, n12, n16, n24, n32, n48, n64, n128},
   maxConfiguredUL-TCI-r17
                                                ENUMERATED {n4, n8, n12, n16, n24, n32, n48, n64},
   maxActivatedDL-TCIAcrossCC-r17
                                                ENUMERATED {n1, n2, n4, n8, n16},
   maxActivatedUL-TCIAcrossCC-r17
                                               ENUMERATED {n1, n2, n4, n8, n16}
} OPTIONAL,
-- R1 23-10-1b Unified TCI with separate DL/UL TCI update for intra-cell beam management with more than one MAC-CE
unifiedSeparateTCI-multiMAC-CE-r17
                                           SEOUENCE {
   minBeamApplicationTime-r17
                                               ENUMERATED {n1, n2, n4, n7, n14, n28, n42, n56, n70, n84, n98, n112, n224, n336},
   maxActivatedDL-TCIPerCC-r17
                                               INTEGER (2..8),
   maxActivatedUL-TCIPerCC-r17
                                               INTEGER (2..8)
                                                                                                           OPTIONAL,
-- R1 23-10-1d Per BWP DL/UL-TCI state pool configuration for CA mode
                                           ENUMERATED {supported}
unifiedSeparateTCI-perBWP-CA-r17
                                                                                                           OPTIONAL,
-- R1 23-10-1e TCI state pool configuration with DL/UL-TCI pool sharing for CA mode
unifiedSeparateTCI-ListSharingCA-r17
                                           SEQUENCE {
   maxNumListDL-TCI-r17
                                                ENUMERATED {n1,n2,n4,n8}
                                                                                                           OPTIONAL,
```

```
maxNumListUL-TCI-r17
                                                ENUMERATED {n1,n2,n4,n8}
                                                                                                         OPTIONAL
 } OPTIONAL.
  -- R1 23-10-1f Common multi-CC DL/UL-TCI state ID update and activation with separate DL/UL TCI update
 OPTIONAL.
 -- 23-10-1m Unified TCI with separate DL/UL TCI update for inter-cell beam management with more than one MAC-CE
 unifiedSeparateTCI-InterCell-r17
                                            SEOUENCE {
     k-DL-PerCC-r17
                                                ENUMERATED {n0, n1, n2, n4},
     k-UL-PerCC-r17
                                                ENUMERATED {n0, n1, n2, n4},
     k-DL-AcrossCC-r17
                                                ENUMERATED {n0, n1, n2, n4},
                                                ENUMERATED {n0, n1, n2, n4}
     k-UL-AcrossCC-r17
                                                                                                         OPTIONAL,
 -- R1 23-1-2 Inter-cell beam measurement and reporting (for inter-cell BM and mTRP)
                                            SEOUENCE {
 unifiedJointTCI-mTRP-InterCell-BM-r17
     maxNumAdditionalPCI-L1-RSRP-r17
                                                INTEGER (1..7),
     maxNumSSB-ResourceL1-RSRP-AcrossCC-r17
                                                ENUMERATED {n1,n2,n4,n8}
                                                                                                         OPTIONAL,
 -- R1 23-1-3 MPE mitigation
 mpe-Mitigation-r17
                                            SEOUENCE {
                                                INTEGER (1..4),
     maxNumP-MPR-RI-pairs-r17
     maxNumConfRS-r17
                                                ENUMERATED {n1, n2, n4, n8, n12, n16, n28, n32, n48, n64}
                                                                                                          OPTIONAL,
 -- R1 23-1-4 UE capability value reporting
 srs-PortReport-r17
                                            SEQUENCE {
         capVal1-r17
                                                ENUMERATED {n1, n2, n4}
                                                                                                          OPTIONAL,
         capVal2-r17
                                                ENUMERATED {n1, n2, n4}
                                                                                                         OPTIONAL,
         capVal3-r17
                                                ENUMERATED {n1, n2, n4}
                                                                                                         OPTIONAL,
                                                ENUMERATED {n1, n2, n4}
         capVal4-r17
                                                                                                         OPTIONAL
                                                                                                         OPTIONAL,
             Monitoring of individual candidates
-- R1 23-2-1a
 mTRP-PDCCH-individual-r17
                                            ENUMERATED {supported}
                                                                                                         OPTIONAL,
-- R1 23-2-lb PDCCH repetition with PDCCH monitoring on any span of up to 3 consecutive OFDM symbols of a slot
 mTRP-PDCCH-anySpan-3Symbols-r17
                                            ENUMERATED {supported}
                                                                                                         OPTIONAL,
 -- R1 23-2-2 Two QCL TypeD for CORESET monitoring in PDCCH repetition
                                            ENUMERATED {supported}
 mTRP-PDCCH-TwoQCL-TypeD-r17
                                                                                                         OPTIONAL,
 -- R1 23-3-1-2b CSI-RS processing framework for SRS with two associated CSI-RS resources
 mTRP-PUSCH-CSI-RS-r17
                                            SEQUENCE {
     maxNumPeriodicSRS-r17
                                                INTEGER (1..8),
     maxNumAperiodicSRS-r17
                                                INTEGER (1..8),
     maxNumSP-SRS-r17
                                                INTEGER (0..8),
     numSRS-ResourcePerCC-r17
                                                INTEGER (1..16),
     numSRS-ResourceNonCodebook-r17
                                                INTEGER (1..2)
                                                                                                         OPTIONAL,
                  Cyclic mapping for Multi-TRP PUSCH repetition
 -- R1 23-3-1a
 mTRP-PUSCH-cyclicMapping-r17
                                            ENUMERATED {typeA,typeB,both}
                                                                                                         OPTIONAL,
 -- R1 23-3-1b Second TPC field for Multi-TRP PUSCH repetition
 mTRP-PUSCH-secondTPC-r17
                                            ENUMERATED {supported}
                                                                                                         OPTIONAL.
 -- R1 23-3-1c
                 Two PHR reporting
 mTRP-PUSCH-twoPHR-Reporting-r17
                                            ENUMERATED {supported}
                                                                                                         OPTIONAL,
 -- R1 23-3-1e A-CSI report
                                            ENUMERATED {supported}
 mTRP-PUSCH-A-CSI-r17
                                                                                                         OPTIONAL,
 -- R1 23-3-1f SP-CSI report
 mTRP-PUSCH-SP-CSI-r17
                                            ENUMERATED {supported}
                                                                                                         OPTIONAL,
 -- R1 23-3-1g CG PUSCH transmission
                                            ENUMERATED {supported}
 mTRP-PUSCH-CG-r17
                                                                                                          OPTIONAL,
```

```
Updating two Spatial relation or two sets of power control parameters for PUCCH group
-- R1 23-3-2d
mTRP-PUCCH-MAC-CE-r17
                                            ENUMERATED {supported}
                                                                                                           OPTIONAL.
-- R1 23-3-2e Maximum number of power control parameter sets configured for multi-TRP PUCCH repetition in FR1
mTRP-PUCCH-maxNum-PC-FR1-r17
                                            INTEGER (3..8)
                                                                                                           OPTIONAL.
-- R1 23-4 IntCell-mTRP
mTRP-inter-Cell-r17
                                            SEOUENCE {
    maxNumAdditionalPCI-Case1-r17
                                                INTEGER (1..7),
    maxNumAdditionalPCI-Case2-r17
                                                INTEGER (0..7)
                                                                                                           OPTIONAL,
-- R1 23-5-1 Group based L1-RSRP reporting enhancements
                               SEQUENCE {
mTRP-GroupBasedL1-RSRP-r17
    maxNumBeamGroups-r17
                                                INTEGER (1..4),
    maxNumRS-WithinSlot-r17
                                                ENUMERATED {n2.n3.n4.n8.n16.n32.n64}.
    maxNumRS-AcrossSlot-r17
                                                ENUMERATED {n8, n16, n32, n64, n128}
                                                                                                           OPTIONAL,
-- R1 23-5-2c MAC-CE based update of explicit BFD-RS mTRP-PUCCH-IntraSlot-r17 => per band
                                            ENUMERATED {n4, n8, n12, n16, n32, n48, n64 }
mTRP-BFD-RS-MAC-CE-r17
                                                                                                           OPTIONAL,
-- R1 23-7-1 Basic Features of CSI Enhancement for Multi-TRP
                                            SEOUENCE {
mTRP-CSI-EnhancementPerBand-r17
    maxNumNZP-CSI-RS-r17
                                                INTEGER (2..8),
    cSI-Report-mode-r17
                                                ENUMERATED {mode1, mode2, both},
                                                SEQUENCE (SIZE (1..16)) OF CSI-MultiTRP-SupportedCombinations-r17,
    supportedComboAcrossCCs-r17
    codebookModeNCJT-r17
                                                ENUMERATED{mode1,mode1And2}
                                                                                                           OPTIONAL,
-- R1 23-7-1b
                Active CSI-RS resources and ports in the presence of multi-TRP CSI
codebookComboParameterMultiTRP-r17
                                            CodebookComboParameterMultiTRP-r17
                                                                                                           OPTIONAL.
-- R1 23-7-1a
               Additional CSI report mode 1
mTRP-CSI-additionalCSI-r17
                                            ENUMERATED {x1,x2}
                                                                                                           OPTIONAL,
-- R1 23-7-4 Support of Nmax=2 for Multi-TRP CSI
                                            ENUMERATED {supported}
mTRP-CSI-N-Max2-r17
                                                                                                           OPTIONAL,
-- R1 23-7-5 CMR sharing
mTRP-CSI-CMR-r17
                                            ENUMERATED {supported}
                                                                                                           OPTIONAL.
-- R1 23-8-11
               Partial frequency sounding of SRS for non-frequency hopping case
srs-partialFreqSounding-r17
                                            ENUMERATED {supported}
                                                                                                           OPTIONAL,
-- R1-24 feature: Extend beamSwitchTiming for FR2-2
beamSwitchTiming-v1710
                                            SEOUENCE {
    scs-480kHz
                                                ENUMERATED {sym56, sym112, sym192, sym896, sym1344}
                                                                                                           OPTIONAL,
    scs-960kHz
                                                ENUMERATED {sym112, sym224, sym384, sym1792, sym2688}
                                                                                                           OPTIONAL
                                                                                                           OPTIONAL,
-- R1-24 feature: Extend beamSwitchTiming-r16 for FR2-2
beamSwitchTiming-r17
    scs-480kHz-r17
                                                ENUMERATED {sym896, sym1344}
                                                                                                           OPTIONAL,
    scs-960kHz-r17
                                                ENUMERATED {sym1792, sym2688}
                                                                                                           OPTIONAL
                                                                                                           OPTIONAL,
-- R1-24 feature: Extend beamReportTiming for FR2-2
beamReportTiming-v1710
    scs-480kHz-r17
                                                ENUMERATED {sym56, sym112, sym224}
                                                                                                           OPTIONAL.
                                                ENUMERATED (sym112, sym224, sym448)
    scs-960kHz-r17
                                                                                                           OPTIONAL
                                                                                                           OPTIONAL,
-- R1-24 feature:
                     Extend maximum number of RX/TX beam switch DL for FR2-2
maxNumberRxTxBeamSwitchDL-v1710
                                            SEOUENCE {
    scs-480kHz-r17
                                                ENUMERATED {n2, n4, n7}
                                                                                                           OPTIONAL,
    scs-960kHz-r17
                                                ENUMERATED {n1, n2, n4, n7}
                                                                                                           OPTIONAL
                                                                                                           OPTIONAL
```

```
]],
    ΓΓ
    -- R1-23-1-4a: Semi-persistent/aperiodic capability value report
    srs-PortReportSP-AP-r17
                                                ENUMERATED {supported}
                                                                                                                OPTIONAL,
    maxNumberRxBeam-v1720
                                                INTEGER (9..12)
                                                                                                                OPTIONAL,
    -- R1-23-6-5
                    Support implicit configuration of RS(s) with two TCI states for beam failure detection
    sfn-ImplicitRS-twoTCI-r17
                                                ENUMERATED {supported}
                                                                                                                OPTIONAL,
    -- R1-23-6-6 QCL-TypeD collision handling with CORESET with 2 TCI states
    sfn-QCL-TypeD-Collision-twoTCI-r17
                                                ENUMERATED {supported}
                                                                                                                OPTIONAL.
    -- R1-23-7-1c Basic Features of CSI Enhancement for Multi-TRP - number of CPUs
    mTRP-CSI-numCPU-r17
                                                ENUMERATED {n2, n3, n4}
                                                                                                                OPTIONAL
    11,
    11
    supportRepNumPDSCH-TDRA-DCI-1-2-r17
                                                ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16}
                                                                                                                OPTIONAL
    11
DummyG ::=
                                    SEOUENCE
    maxNumberSSB-CSI-RS-ResourceOneTx
                                        ENUMERATED {n8, n16, n32, n64},
    maxNumberSSB-CSI-RS-ResourceTwoTx
                                        ENUMERATED {n0, n4, n8, n16, n32, n64},
    supportedCSI-RS-Density
                                        ENUMERATED {one, three, oneAndThree}
BeamManagementSSB-CSI-RS ::=
                                    SEQUENCE {
    maxNumberSSB-CSI-RS-ResourceOneTx
                                        ENUMERATED {n0, n8, n16, n32, n64},
    maxNumberCSI-RS-Resource
                                        ENUMERATED {n0, n4, n8, n16, n32, n64},
                                        ENUMERATED {n0, n4, n8, n16, n32, n64},
    maxNumberCSI-RS-ResourceTwoTx
    supportedCSI-RS-Density
                                        ENUMERATED {one, three, oneAndThree}
                                                                                                                    OPTIONAL,
                                        ENUMERATED {n0, n1, n4, n8, n16, n32, n64}
    maxNumberAperiodicCSI-RS-Resource
DummyH ::=
                                    SEQUENCE {
    burstLength
                                        INTEGER (1..2),
    maxSimultaneousResourceSetsPerCC
                                        INTEGER (1..8),
    maxConfiguredResourceSetsPerCC
                                        INTEGER (1..64),
    maxConfiguredResourceSetsAllCC
                                        INTEGER (1..128)
CSI-RS-ForTracking ::=
                                    SEOUENCE {
    maxBurstLength
                                        INTEGER (1..2),
    maxSimultaneousResourceSetsPerCC
                                        INTEGER (1..8),
    maxConfiguredResourceSetsPerCC
                                        INTEGER (1..64),
    maxConfiguredResourceSetsAllCC
                                        INTEGER (1..256)
CSI-RS-IM-ReceptionForFeedback ::=
                                                SEQUENCE {
    maxConfigNumberNZP-CSI-RS-PerCC
                                                    INTEGER (1..64),
    maxConfigNumberPortsAcrossNZP-CSI-RS-PerCC
                                                    INTEGER (2..256),
    maxConfigNumberCSI-IM-PerCC
                                                    ENUMERATED {n1, n2, n4, n8, n16, n32},
    maxNumberSimultaneousNZP-CSI-RS-PerCC
                                                    INTEGER (1..64),
    totalNumberPortsSimultaneousNZP-CSI-RS-PerCC
                                                    INTEGER (2..256)
CSI-RS-ProcFrameworkForSRS ::=
                                                SEOUENCE {
```

```
maxNumberPeriodicSRS-AssocCSI-RS-PerBWP
                                                     INTEGER (1..4),
    maxNumberAperiodicSRS-AssocCSI-RS-PerBWP
                                                     INTEGER (1..4),
    maxNumberSP-SRS-AssocCSI-RS-PerBWP
                                                     INTEGER (0..4).
    simultaneousSRS-AssocCSI-RS-PerCC
                                                     INTEGER (1..8)
CSI-ReportFramework ::=
                                                 SEOUENCE {
    maxNumberPeriodicCSI-PerBWP-ForCSI-Report
                                                     INTEGER (1..4),
    maxNumberAperiodicCSI-PerBWP-ForCSI-Report
                                                     INTEGER (1..4),
    maxNumberSemiPersistentCSI-PerBWP-ForCSI-Report INTEGER (0..4),
    maxNumberPeriodicCSI-PerBWP-ForBeamReport
                                                     INTEGER (1..4),
    maxNumberAperiodicCSI-PerBWP-ForBeamReport
                                                     INTEGER (1..4),
                                                     ENUMERATED {n3, n7, n15, n31, n63, n128},
    maxNumberAperiodicCSI-triggeringStatePerCC
    maxNumberSemiPersistentCSI-PerBWP-ForBeamReport INTEGER (0..4),
    simultaneousCSI-ReportsPerCC
                                                     INTEGER (1..8)
CSI-ReportFrameworkExt-r16 ::=
                                                     SEOUENCE {
    maxNumberAperiodicCSI-PerBWP-ForCSI-ReportExt-r16 INTEGER (5..8)
PTRS-DensityRecommendationDL ::=
                                    SEQUENCE {
    frequencyDensity1
                                         INTEGER (1..276),
    frequencyDensity2
                                         INTEGER (1..276),
    timeDensity1
                                        INTEGER (0..29),
    timeDensity2
                                        INTEGER (0..29),
    timeDensity3
                                        INTEGER (0..29)
PTRS-DensityRecommendationUL ::=
                                    SEOUENCE {
    frequencyDensity1
                                         INTEGER (1..276),
    frequencyDensity2
                                        INTEGER (1..276),
    timeDensity1
                                        INTEGER (0..29),
    timeDensity2
                                        INTEGER (0..29),
    timeDensitv3
                                        INTEGER (0..29),
    sampleDensity1
                                        INTEGER (1..276),
    sampleDensity2
                                        INTEGER (1..276),
    sampleDensity3
                                        INTEGER (1..276),
    sampleDensity4
                                        INTEGER (1..276),
    sampleDensity5
                                        INTEGER (1..276)
SpatialRelations ::=
                                        SEOUENCE {
    maxNumberConfiguredSpatialRelations
                                             ENUMERATED {n4, n8, n16, n32, n64, n96},
    maxNumberActiveSpatialRelations
                                            ENUMERATED {n1, n2, n4, n8, n14},
    additionalActiveSpatialRelationPUCCH
                                            ENUMERATED {supported}
                                                                                                  OPTIONAL,
    maxNumberDL-RS-QCL-TypeD
                                            ENUMERATED {n1, n2, n4, n8, n14}
DummyI ::=
                         SEOUENCE {
                                         ENUMERATED {t1r2, t1r4, t2r4, t1r4-t2r4, tr-equal},
    supportedSRS-TxPortSwitch
    txSwitchImpactToRx
                                        ENUMERATED {true}
                                                                                                  OPTIONAL
```

MIMO-ParametersPerBand field descriptions

codebookParametersPerBand

For a given frequency band, this field indicates the alternative list of *SupportedCSI-RS-Resource* supported for each codebook type. The supported CSI-RS resources indicated by this field are referred by *codebookParametersperBC* in *CA-ParametersNR* to indicate the supported CSI-RS resource per band combination.

csi-RS-IM-ReceptionForFeedback/ csi-RS-ProcFrameworkForSRS/ csi-ReportFramework

CSI related capabilities which the UE supports on each of the carriers operated on this band. If the network configures the UE with serving cells on both FR1 and FR2 bands these values may be further limited by the corresponding fields in *fr1-fr2-Add-UE-NR-Capabilities*.

supportNewDMRS-Port

Presence of this field set to supported1, supported2 or supported3 indicates that the UE supports the new DMRS port entry {0,2,3}.

ModulationOrder

The IE *ModulationOrder* is used to convey the maximum supported modulation order.

ModulationOrder information element

```
-- ASN1START
-- TAG-MODULATIONORDER-START

ModulationOrder ::= ENUMERATED {bpsk-halfpi, bpsk, qpsk, qam16, qam64, qam256}
-- TAG-MODULATIONORDER-STOP
-- ASN1STOP
```

MRDC-Parameters

The IE MRDC-Parameters contains the band combination parameters specific to MR-DC for a given MR-DC band combination.

MRDC-Parameters information element

```
tdm-Pattern
                                       ENUMERATED
                                                 {supported}
                                                                         OPTIONAL,
    ul-SharingEUTRA-NR
                                      ENUMERATED
                                                 {tdm, fdm, both}
                                                                         OPTIONAL,
    ul-SwitchingTimeEUTRA-NR
                                       ENUMERATED
                                                 {type1, type2}
                                                                          OPTIONAL.
    simultaneousRxTxInterBandENDC
                                      ENUMERATED {supported}
                                                                         OPTIONAL,
    asyncIntraBandENDC
                                       ENUMERATED {supported}
                                                                          OPTIONAL,
    . . . ,
    Π
    dualPA-Architecture
                                       ENUMERATED
                                                 {supported}
                                                                          OPTIONAL,
    intraBandENDC-Support
                                      ENUMERATED
                                                 {non-contiguous, both}
                                                                         OPTIONAL,
    ul-TimingAlignmentEUTRA-NR
                                      ENUMERATED {required}
                                                                          OPTIONAL
    11
MRDC-Parameters-v1580 ::= SEOUENCE {
    dynamicPowerSharingNEDC
                                       ENUMERATED {supported}
                                                                          OPTIONAL
MRDC-Parameters-v1590 ::=
                           SEOUENCE ·
                                       ENUMERATED {supported}
    interBandContiquousMRDC
                                                                          OPTIONAL
MRDC-Parameters-v15q0 ::= SEOUENCE {
    simultaneousRxTxInterBandENDCPerBandPair SimultaneousRxTxPerBandPair OPTIONAL
MRDC-Parameters-v1620 ::=
                            SEOUENCE {
   maxUplinkDutyCycle-interBandENDC-TDD-PC2-r16
                                                  SEQUENCE {
       eutra-TDD-Config0-r16
                               ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}
                                                                                      OPTIONAL,
                               ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}
       eutra-TDD-Config1-r16
                                                                                      OPTIONAL,
       eutra-TDD-Config2-r16
                               ENUMERATED
                                          {n20, n40, n50, n60, n70, n80, n90, n100}
                                                                                      OPTIONAL,
       eutra-TDD-Config3-r16
                               ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}
                                                                                      OPTIONAL,
       eutra-TDD-Config4-r16
                               ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}
                                                                                      OPTIONAL,
       eutra-TDD-Config5-r16
                                ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}
                                                                                      OPTIONAL,
                               ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}
       eutra-TDD-Config6-r16
                                                                                      OPTIONAL
                                                                                      OPTIONAL,
    -- R1 18-2 Single UL TX operation for TDD PCell in EN-DC
    tdm-restrictionTDD-endc-r16
                                       ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 18-2a Single UL TX operation for FDD PCell in EN-DC
    tdm-restrictionFDD-endc-r16
                                       ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 18-2b Support of HARO-offset for SUO casel in EN-DC with LTE TDD PCell for type 1 UE
    singleUL-HARO-offsetTDD-PCell-r16
                                       ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 18-3 Dual Tx transmission for EN-DC with FDD PCell(TDM pattern for dual Tx UE)
    OPTIONAL
MRDC-Parameters-v1630 ::= SEQUENCE {
    -- R4 2-20 Maximum uplink duty cycle for FDD+TDD EN-DC power class 2
   maxUplinkDutyCycle-FDD-TDD-EN-DC1-r16
                                                        ENUMERATED {n30, n40, n50, n60, n70, n80, n90, n100}
                                                                                                               OPTIONAL,
       maxUplinkDutyCycle-FDD-TDD-EN-DC2-r16
                                                        ENUMERATED {n30, n40, n50, n60, n70, n80, n90, n100}
                                                                                                               OPTIONAL
                                                                                                               OPTIONAL,
    -- R4 2-19 FDD-FDD or TDD-TDD inter-band MR-DC with overlapping or partially overlapping DL spectrum
                                              ENUMERATED {supported}
    interBandMRDC-WithOverlapDL-Bands-r16
                                                                                      OPTIONAL
```

NRDC-Parameters

The IE NRDC-Parameters contains parameters specific to NR-DC, i.e., which are not applicable to NR SA.

NRDC-Parameters information element

```
-- ASN1START
-- TAG-NRDC-PARAMETERS-START
NRDC-Parameters ::=
                                     SEQUENCE {
    measAndMobParametersNRDC
                                         MeasAndMobParametersMRDC
                                                                                      OPTIONAL.
    generalParametersNRDC
                                         GeneralParametersMRDC-XDD-Diff
                                                                                      OPTIONAL,
    fdd-Add-UE-NRDC-Capabilities
                                         UE-MRDC-CapabilityAddXDD-Mode
                                                                                      OPTIONAL,
    tdd-Add-UE-NRDC-Capabilities
                                         UE-MRDC-CapabilityAddXDD-Mode
                                                                                      OPTIONAL,
    fr1-Add-UE-NRDC-Capabilities
                                         UE-MRDC-CapabilityAddFRX-Mode
                                                                                      OPTIONAL,
    fr2-Add-UE-NRDC-Capabilities
                                         UE-MRDC-CapabilityAddFRX-Mode
                                                                                      OPTIONAL,
    dummy2
                                         OCTET STRING
                                                                                      OPTIONAL,
    dummy
                                         SEQUENCE {}
                                                                                      OPTIONAL
NRDC-Parameters-v1570 ::=
                                     SEOUENCE {
    sfn-SyncNRDC
                                         ENUMERATED {supported}
                                                                                      OPTIONAL
NRDC-Parameters-v15c0 ::=
                                     SEQUENCE {
    pdcp-DuplicationSplitSRB
                                         ENUMERATED {supported}
                                                                                      OPTIONAL,
    pdcp-DuplicationSplitDRB
                                         ENUMERATED {supported}
                                                                                      OPTIONAL
NRDC-Parameters-v1610 ::=
                                     SEQUENCE {
    measAndMobParametersNRDC-v1610
                                         MeasAndMobParametersMRDC-v1610
                                                                                      OPTIONAL
NRDC-Parameters-v1700
    f1c-OverNR-RRC-r17
                                         ENUMERATED {supported}
                                                                                      OPTIONAL,
                                         MeasAndMobParametersMRDC-v1700
    measAndMobParametersNRDC-v1700
-- TAG-NRDC-PARAMETERS-STOP
-- ASN1STOP
```

NTN-Parameters

The IE NTN-Parameters is used to convey the subset of UE Radio Access Capability Parameters that apply to NTN access when there is a difference compared to TN access.

NTN-Parameters information element

```
-- ASN1START
-- TAG-NTN-PARAMETERS-START
NTN-Parameters-r17 ::= SEQUENCE {
    inactiveStateNTN-r17
                                        ENUMERATED {supported}
                                                                                              OPTIONAL,
    ra-SDT-NTN-r17
                                        ENUMERATED {supported}
                                                                                               OPTIONAL,
    srb-SDT-NTN-r17
                                        ENUMERATED {supported}
                                                                                              OPTIONAL,
    measAndMobParametersNTN-r17
                                        MeasAndMobParameters
                                                                                              OPTIONAL,
                                        MAC-Parameters
    mac-ParametersNTN-r17
                                                                                              OPTIONAL,
    phy-ParametersNTN-r17
                                        Phy-Parameters
                                                                                               OPTIONAL,
    fdd-Add-UE-NR-CapabilitiesNTN-r17
                                       UE-NR-CapabilityAddXDD-Mode
                                                                                               OPTIONAL,
    fr1-Add-UE-NR-CapabilitiesNTN-r17
                                        UE-NR-CapabilityAddFRX-Mode
                                                                                              OPTIONAL,
    ue-BasedPerfMeas-ParametersNTN-r17 UE-BasedPerfMeas-Parameters-r16
                                                                                               OPTIONAL,
    son-ParametersNTN-r17
                                        SON-Parameters-r16
                                                                                               OPTIONAL
-- TAG-NTN-PARAMETERS-STOP
-- ASN1STOP
```

NTN-Parameters field descriptions

fdd-Add-UE-NR-CapabilitiesNTN

NTN related capabilities which the UE supports in NTN differently than in TN. If absent, fdd-Add-UE-NR-Capabilities applies to NTN.

fr1-Add-UE-NR-CapabilitiesNTN

NTN related capabilities which the UE supports in NTN differently than in TN. If absent, fr1-Add-UE-NR-Capabilities applies to NTN.

mac-ParametersNTN

NTN related capabilities which the UE supports in NTN differently than in TN. If absent, mac-Parameters applies to NTN.

measAndMobParametersNTN

NTN related capabilities which the UE supports in NTN differently than in TN. If absent, measAndMobParameters applies to NTN.

phy-ParametersNTN

NTN related capabilities which the UE supports in NTN differently than in TN. If absent, phy-Parameters applies to NTN.

son-ParametersNTN

NTN related capabilities which the UE supports in NTN differently than in TN. If absent, son-Parameters-r16 applies to NTN.

ue-BasedPerfMeas-ParametersNTN

NTN related capabilities which the UE supports in NTN differently than in TN. If absent, ue-BasedPerfMeas-Parameters-r16 applies to NTN.

OLPC-SRS-Pos

The IE OLPC-SRS-Pos is used to convey OLPC SRS positioning related parameters specific for a certain band.

OLPC-SRS-Pos information element

```
-- ASN1START
-- TAG-OLPC-SRS-POS-START
OLPC-SRS-Pos-r16 ::=
                            SEOUENCE
    olpc-SRS-PosBasedOnPRS-Serving-r16
                                               ENUMERATED {supported}
                                                                                     OPTIONAL,
    olpc-SRS-PosBasedOnSSB-Neigh-r16
                                               ENUMERATED
                                                           {supported}
                                                                                     OPTIONAL,
    olpc-SRS-PosBasedOnPRS-Neigh-r16
                                               ENUMERATED {supported}
                                                                                     OPTIONAL.
    maxNumberPathLossEstimatePerServing-r16
                                               ENUMERATED {n1, n4, n8, n16}
                                                                                     OPTIONAL
--TAG-OLPC-SRS-POS-STOP
-- ASN1STOP
```

PDCP-Parameters

The IE *PDCP-Parameters* is used to convey capabilities related to PDCP.

PDCP-Parameters information element

```
-- ASN1START
-- TAG-PDCP-PARAMETERS-START
PDCP-Parameters ::=
                            SEQUENCE {
    supportedROHC-Profiles
                                SEQUENCE {
        profile0x0000
                                     BOOLEAN,
        profile0x0001
                                     BOOLEAN,
        profile0x0002
                                     BOOLEAN,
        profile0x0003
                                     BOOLEAN,
        profile0x0004
                                     BOOLEAN,
        profile0x0006
                                     BOOLEAN,
        profile0x0101
                                     BOOLEAN,
        profile0x0102
                                     BOOLEAN,
        profile0x0103
                                     BOOLEAN,
        profile0x0104
                                     BOOLEAN
    maxNumberROHC-ContextSessions
                                         ENUMERATED {cs2, cs4, cs8, cs12, cs16, cs24, cs32, cs48, cs64,
                                                 cs128, cs256, cs512, cs1024, cs16384, spare2, spare1},
    uplinkOnlyROHC-Profiles
                                         ENUMERATED {supported}
                                                                      OPTIONAL,
    continueROHC-Context
                                                    {supported}
                                         ENUMERATED
                                                                      OPTIONAL,
    outOfOrderDelivery
                                         ENUMERATED
                                                    {supported}
                                                                      OPTIONAL,
    shortSN
                                         ENUMERATED
                                                    {supported}
                                                                      OPTIONAL,
    pdcp-DuplicationSRB
                                         ENUMERATED {supported}
                                                                      OPTIONAL,
    pdcp-DuplicationMCG-OrSCG-DRB
                                         ENUMERATED {supported}
                                                                      OPTIONAL,
```

```
drb-IAB-r16
                                         ENUMERATED
                                                    {supported}
                                                                      OPTIONAL,
    non-DRB-IAB-r16
                                         ENUMERATED
                                                    {supported}
                                                                      OPTIONAL,
    extendedDiscardTimer-r16
                                         ENUMERATED
                                                    {supported}
                                                                      OPTIONAL,
    continueEHC-Context-r16
                                         ENUMERATED
                                                    {supported}
                                                                      OPTIONAL,
                                                    {supported}
    ehc-r16
                                         ENUMERATED
                                                                      OPTIONAL,
    maxNumberEHC-Contexts-r16
                                         ENUMERATED {cs2, cs4, cs8, cs16, cs32, cs64, cs128, cs256, cs512,
                                                     cs1024, cs2048, cs4096, cs8192, cs16384, cs32768, cs65536}
                                                                                                                     OPTIONAL,
    jointEHC-ROHC-Config-r16
                                         ENUMERATED
                                                    {supported}
                                                                      OPTIONAL,
    pdcp-DuplicationMoreThanTwoRLC-r16
                                        ENUMERATED {supported}
                                                                      OPTIONAL
    ]],
    ] ]
    longSN-RedCap-r17
                                         ENUMERATED {supported}
                                                                      OPTIONAL,
    udc-r17
                                         SEOUENCE {
        standardDictionary-r17
                                             ENUMERATED {supported}
                                                                      OPTIONAL,
        operatorDictionary-r17
                                             SEOUENCE {
            versionOfDictionary-r17
                                                 INTEGER (0..15),
            associatedPLMN-ID-r17
                                                 PLMN-Identity
                                                                      OPTIONAL,
        continueUDC-r17
                                             ENUMERATED {supported}
                                                                      OPTIONAL,
        supportOfBufferSize-r17
                                             ENUMERATED {kbyte4, kbyte8} OPTIONAL
                                                                      OPTIONAL
    11
-- TAG-PDCP-PARAMETERS-STOP
-- ASN1STOP
```

PDCP-ParametersMRDC

The IE *PDCP-ParametersMRDC* is used to convey PDCP related capabilities for MR-DC.

PDCP-ParametersMRDC information element

```
-- ASN1START
-- TAG-PDCP-PARAMETERSMRDC-START
PDCP-ParametersMRDC ::=
                                         SEQUENCE {
    pdcp-DuplicationSplitSRB
                                             ENUMERATED {supported}
                                                                          OPTIONAL,
    pdcp-DuplicationSplitDRB
                                             ENUMERATED {supported}
                                                                          OPTIONAL
PDCP-ParametersMRDC-v1610 ::= SEQUENCE {
    scg-DRB-NR-IAB-r16
                                         ENUMERATED {supported}
                                                                          OPTIONAL
-- TAG-PDCP-PARAMETERSMRDC-STOP
-- ASN1STOP
```

Phy-Parameters

The IE *Phy-Parameters* is used to convey the physical layer capabilities.

Phy-Parameters information element

```
-- ASN1START
-- TAG-PHY-PARAMETERS-START
                                     SEOUENCE {
Phy-Parameters ::=
    phy-ParametersCommon
                                         Phy-ParametersCommon
                                                                                       OPTIONAL.
    phy-ParametersXDD-Diff
                                         Phy-ParametersXDD-Diff
                                                                                       OPTIONAL,
    phy-ParametersFRX-Diff
                                         Phy-ParametersFRX-Diff
                                                                                       OPTIONAL,
    phy-ParametersFR1
                                         Phy-ParametersFR1
                                                                                       OPTIONAL,
    phy-ParametersFR2
                                         Phy-ParametersFR2
                                                                                       OPTIONAL
Phy-Parameters-v16a0 ::=
                                     SEOUENCE {
    phy-ParametersCommon-v16a0
                                         Phy-ParametersCommon-v16a0
                                                                                       OPTIONAL
Phy-ParametersCommon ::=
                                     SEOUENCE
    csi-RS-CFRA-ForHO
                                         ENUMERATED
                                                    {supported}
                                                                                       OPTIONAL,
                                                     {supported
    dynamicPRB-BundlingDL
                                         ENUMERATED
                                                                                       OPTIONAL,
                                         ENUMERATED
                                                     {supported
    sp-CSI-ReportPUCCH
                                                                                       OPTIONAL,
    sp-CSI-ReportPUSCH
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    nzp-CSI-RS-IntefMamt
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL.
                                         ENUMERATED
    type2-SP-CSI-Feedback-LongPUCCH
                                                     {supported
                                                                                       OPTIONAL,
    precoderGranularityCORESET
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL.
    dynamicHARO-ACK-Codebook
                                         ENUMERATED
                                                     supported
                                                                                       OPTIONAL,
    semiStaticHARO-ACK-Codebook
                                         ENUMERATED
                                                     supported
                                                                                       OPTIONAL,
    spatialBundlingHARO-ACK
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    dynamicBetaOffsetInd-HARQ-ACK-CSI
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    pucch-Repetition-F1-3-4
                                         ENUMERATED
                                                     supported
                                                                                       OPTIONAL,
    ra-Type0-PUSCH
                                         ENUMERATED
                                                     supported
                                                                                       OPTIONAL,
    dynamicSwitchRA-Type0-1-PDSCH
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    dynamicSwitchRA-Type0-1-PUSCH
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    pdsch-MappingTypeA
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL.
    pdsch-MappingTypeB
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    interleavingVRB-ToPRB-PDSCH
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    interSlotFreqHopping-PUSCH
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    type1-PUSCH-RepetitionMultiSlots
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    type2-PUSCH-RepetitionMultiSlots
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    pusch-RepetitionMultiSlots
                                         ENUMERATED
                                                     supported
                                                                                       OPTIONAL,
    pdsch-RepetitionMultiSlots
                                         ENUMERATED
                                                     supported
                                                                                       OPTIONAL,
    downlinkSPS
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    configuredUL-GrantType1
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    configuredUL-GrantType2
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    pre-EmptIndication-DL
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    cbg-TransIndication-DL
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL.
    cbg-TransIndication-UL
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    cbg-FlushIndication-DL
                                         ENUMERATED
                                                     {supported
                                                                                       OPTIONAL,
    dynamicHARQ-ACK-CodeB-CBG-Retx-DL
                                         ENUMERATED {supported}
                                                                                       OPTIONAL,
```

```
rateMatchingResrcSetSemi-Static
                                         ENUMERATED
                                                    {supported}
                                                                                      OPTIONAL,
    rateMatchingResrcSetDynamic
                                        ENUMERATED
                                                    {supported}
                                                                                      OPTIONAL,
    bwp-SwitchingDelay
                                         ENUMERATED {type1, type2}
                                                                                      OPTIONAL.
    Π
                                         ENUMERATED {supported}
                                                                                      OPTIONAL
    dummy
    ]],
    11
    maxNumberSearchSpaces
                                         ENUMERATED
                                                   {n10}
                                                                                      OPTIONAL,
    rateMatchingCtrlResrcSetDynamic
                                         ENUMERATED
                                                   {supported}
                                                                                      OPTIONAL.
    maxLayersMIMO-Indication
                                         ENUMERATED {supported}
                                                                                      OPTIONAL
    11,
    11
    spCellPlacement
                                                 CarrierAggregationVariant
                                                                                      OPTIONAL
    11.
    Π
    -- R1 9-1: Basic channel structure and procedure of 2-step RACH
                                                 ENUMERATED {supported}
    twoStepRACH-r16
                                                                                      OPTIONAL,
    -- R1 11-1: Monitoring DCI format 1 2 and DCI format 0 2
    dci-Format1-2And0-2-r16
                                                 ENUMERATED {supported}
                                                                                      OPTIONAL.
    -- R1 11-1a: Monitoring both DCI format 0_1/1_1 and DCI format 0_2/1_2 in the same search space
    monitoringDCI-SameSearchSpace-r16
                                                 ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 11-10: Type 2 configured grant release by DCI format 0_1
    tvpe2-CG-ReleaseDCI-0-1-r16
                                                 ENUMERATED {supported}
                                                                                      OPTIONAL.
    -- R1 11-11: Type 2 configured grant release by DCI format 0_2
    type2-CG-ReleaseDCI-0-2-r16
                                                 ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 12-3: SPS release by DCI format 1_1
    sps-ReleaseDCI-1-1-r16
                                                 ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 12-3a: SPS release by DCI format 1 2
                                                 ENUMERATED {supported}
    sps-ReleaseDCI-1-2-r16
                                                                                      OPTIONAL,
    -- R1 14-8: CSI trigger states containing non-active BWP
    csi-TriggerStateNon-ActiveBWP-r16
                                                 ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 20-2: Support up to 4 SMTCs configured for an IAB node MT per frequency location, including IAB-specific SMTC window periodicities
    separateSMTC-InterIAB-Support-r16
                                                 ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 20-3: Support RACH configuration separately from the RACH configuration for UE access, including new IAB-specific offset and scaling
factors
                                                 ENUMERATED {supported}
    separateRACH-IAB-Support-r16
                                                                                      OPTIONAL,
    -- R1 20-5a: Support semi-static configuration/indication of UL-Flexible-DL slot formats for IAB-MT resources
    ul-flexibleDL-SlotFormatSemiStatic-IAB-r16 ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 20-5b: Support dynamic indication of UL-Flexible-DL slot formats for IAB-MT resources
    ul-flexibleDL-SlotFormatDynamics-IAB-r16
                                                 ENUMERATED {supported}
                                                                                      OPTIONAL,
    dft-S-OFDM-WaveformUL-IAB-r16
                                                 ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 20-6: Support DCI Format 2_5 based indication of soft resource availability to an IAB node
                                                 ENUMERATED {supported}
    dci-25-AI-RNTI-Support-IAB-r16
                                                                                      OPTIONAL,
    -- R1 20-7: Support T delta reception.
    t-DeltaReceptionSupport-IAB-r16
                                                 ENUMERATED {supported}
                                                                                      OPTIONAL.
    -- R1 20-8: Support of Desired guard symbol reporting and provided guard symbok reception.
    guardSymbolReportReception-IAB-r16
                                                 ENUMERATED {supported}
                                                                                      OPTIONAL,
    -- R1 18-8 HARQ-ACK codebook type and spatial bundling per PUCCH group
                                                ENUMERATED {supported}
    hargACK-CB-SpatialBundlingPUCCH-Group-r16
                                                                                      OPTIONAL,
    -- R1 19-2: Cross Slot Scheduling
    crossSlotScheduling-r16
                                                 SEOUENCE {
        non-SharedSpectrumChAccess-r16
                                                     ENUMERATED {supported}
                                                                                      OPTIONAL,
        sharedSpectrumChAccess-r16
                                                     ENUMERATED {supported}
                                                                                      OPTIONAL
```

```
OPTIONAL,
maxNumberSRS-PosPathLossEstimateAllServingCells-r16 ENUMERATED {n1, n4, n8, n16}
                                                                                        OPTIONAL,
extendedCG-Periodicities-r16
                                           ENUMERATED {supported}
                                                                               OPTIONAL.
                                           ENUMERATED {supported}
extendedSPS-Periodicities-r16
                                                                               OPTIONAL,
codebookVariantsList-r16
                                           CodebookVariantsList-r16
                                                                               OPTIONAL,
-- R1 11-6: PUSCH repetition Type A
pusch-RepetitionTypeA-r16
                                           SEOUENCE {
    sharedSpectrumChAccess-r16
                                               ENUMERATED {supported}
                                                                               OPTIONAL.
   non-SharedSpectrumChAccess-r16
                                               ENUMERATED {supported}
                                                                               OPTIONAL
                                                                               OPTIONAL.
-- R1 11-4b: DL priority indication in DCI with mixed DCI formats
dci-DL-PriorityIndicator-r16
                                           ENUMERATED {supported}
                                                                               OPTIONAL.
-- R1 12-1a: UL priority indication in DCI with mixed DCI formats
dci-UL-PriorityIndicator-r16
                                           ENUMERATED {supported}
                                                                              OPTIONAL.
-- R1 16-le: Maximum number of configured pathloss reference RSs for PUSCH/PUCCH/SRS by RRC for MAC-CE based pathloss reference RS update
                                           ENUMERATED {n4, n8, n16, n32, n64} OPTIONAL,
maxNumberPathlossRS-Update-r16
-- R1 18-9: Usage of the PDSCH starting time for HARO-ACK type 2 codebook
type2-HARO-ACK-Codebook-r16
                                           ENUMERATED {supported}
                                                                               OPTIONAL,
-- R1 16-1g-1: Resources for beam management, pathloss measurement, BFD, RLM and new beam identification across frequency ranges
maxTotalResourcesForAcrossFreqRanges-r16
                                           SEOUENCE {
   maxNumberResWithinSlotAcrossCC-AcrossFR-r16 ENUMERATED {n2, n4, n8, n12, n16, n32, n64, n128}
   maxNumberResAcrossCC-AcrossFR-r16
                                               ENUMERATED {n2, n4, n8, n12, n16, n32, n40, n48, n64, n72, n80, n96, n128, n256}
                                                                              OPTIONAL
                                                                              OPTIONAL,
-- R1 16-2a-4: HARO-ACK for multi-DCI based multi-TRP - separate
hargACK-separateMultiDCI-MultiTRP-r16
                                           SEQUENCE {
maxNumberLongPUCCHs-r16
                                               ENUMERATED {longAndLong, longAndShort, shortAndShort}
                                                                                                       OPTIONAL
                                                                              OPTIONAL,
-- R1 16-2a-4: HARQ-ACK for multi-DCI based multi-TRP - joint
hargACK-jointMultiDCI-MultiTRP-r16
                                           ENUMERATED {supported}
                                                                               OPTIONAL.
-- R4 9-1: BWP switching on multiple CCs RRM requirements
bwp-SwitchingMultiCCs-r16
                                           CHOICE {
    type1-r16
                                               ENUMERATED {us100, us200},
   type2-r16
                                               ENUMERATED {us200, us400, us800, us1000}
                                                                              OPTIONAL
]],
                                           ENUMERATED {supported}
targetSMTC-SCG-r16
                                                                               OPTIONAL,
supportRepetitionZeroOffsetRV-r16
                                           ENUMERATED {supported}
                                                                               OPTIONAL,
-- R1 11-12: in-order CBG-based re-transmission
cbg-TransInOrderPUSCH-UL-r16
                                           ENUMERATED {supported}
                                                                               OPTIONAL
]],
Π
-- R4 6-3: Dormant BWP switching on multiple CCs RRM requirements
bwp-SwitchingMultiDormancyCCs-r16
                                           CHOICE {
   type1-r16
                                               ENUMERATED {us100, us200},
    type2-r16
                                               ENUMERATED {us200, us400, us800, us1000}
                                                                               OPTIONAL.
-- R1 16-2a-8: Indicates that retransmission scheduled by a different CORESETPoolIndex for multi-DCI multi-TRP is not supported.
supportRetx-Diff-CoresetPool-Multi-DCI-TRP-r16
                                                           ENUMERATED {notSupported}
                                                                                              OPTIONAL,
-- R1 22-10: Support of pdcch-MonitoringAnyOccasionsWithSpanGap in case of cross-carrier scheduling with different SCSs
OPTIONAL
]],
```

```
-- R1 16-1j-1: Support of 2 port CSI-RS for new beam identification
newBeamIdentifications2PortCSI-RS-r16
                                            ENUMERATED {supported}
                                                                                 OPTIONAL.
-- R1 16-1j-2: Support of 2 port CSI-RS for pathloss estimation
pathlossEstimation2PortCSI-RS-r16
                                            ENUMERATED {supported}
                                                                                 OPTIONAL
]],
Π
mux-HARO-ACK-withoutPUCCH-onPUSCH-r16
                                            ENUMERATED {supported}
                                                                                 OPTIONAL
11,
11
-- R1 31-1: Support of Desired Guard Symbol reporting and provided guard symbol reception.
guardSymbolReportReception-IAB-r17
                                            ENUMERATED {supported}
                                                                                 OPTIONAL,
-- R1 31-2: support of restricted IAB-DU beam reception
restricted-IAB-DU-BeamReception-r17
                                            ENUMERATED {supported}
                                                                                 OPTIONAL.
-- R1 31-3: support of recommended IAB-MT beam transmission for DL and UL beam
recommended-IAB-MT-BeamTransmission-r17
                                            ENUMERATED {supported}
                                                                                 OPTIONAL,
-- R1 31-4: support of case 6 timing alignment indication reception
case6-TimingAlignmentReception-IAB-r17
                                            ENUMERATED {supported}
                                                                                 OPTIONAL,
-- R1 31-5: support of case 7 timing offset indication reception and case 7 timing at parent-node indication reception
                                            ENUMERATED {supported}
case7-TimingAlignmentReception-IAB-r17
                                                                                 OPTIONAL.
-- R1 31-6: support of desired DL Tx power adjustment reporting and DL Tx power adjustment reception
dl-tx-PowerAdjustment-IAB-r17
                                            ENUMERATED {supported}
                                                                                 OPTIONAL,
-- R1 31-7: support of desired IAB-MT PSD range reporting
desired-ul-tx-PowerAdjustment-r17
                                            ENUMERATED {supported}
                                                                                 OPTIONAL.
-- R1 31-8: support of monitoring DCI Format 2_5 scrambled by AI-RNTI for indication of FDM soft resource availability to an IAB node
fdm-SoftResourceAvailability-DynamicIndication-r17 ENUMERATED{supported}
                                                                                 OPTIONAL,
-- R1 31-10: Support of updated T delta range reception
updated-T-DeltaRangeRecption-r17
                                            ENUMERATED{supported}
                                                                                 OPTIONAL,
-- R1 30-5: Support slot based dynamic PUCCH repetition indication for PUCCH formats 0/1/2/3/4
                                            ENUMERATED {supported}
slotBasedDynamicPUCCH-Rep-r17
                                                                                 OPTIONAL,
-- R1 25-1: Support of HARO-ACK deferral in case of TDD collision
sps-HARQ-ACK-Deferral-r17
                                            SEQUENCE {
   non-SharedSpectrumChAccess-r17
                                                ENUMERATED {supported}
                                                                                 OPTIONAL.
   sharedSpectrumChAccess-r17
                                                ENUMERATED {supported}
                                                                                 OPTIONAL
                                                                                 OPTIONAL,
-- R1 23-1-1k Maximum number of configured CC lists (per UE)
unifiedJointTCI-commonUpdate-r17
                                            INTEGER (1..4)
                                                                                 OPTIONAL,
-- R1 23-2-1c PDCCH repetition with a single span of three contiguous OFDM symbols that is within the first four OFDM symbols in a slot
mTRP-PDCCH-singleSpan-r17
                                            ENUMERATED {supported}
                                                                                 OPTIONAL,
-- R1 27-23: Support of more than one activated PRS processing windows across all active DL BWPs
supportedActivatedPRS-ProcessingWindow-r17 ENUMERATED {n2, n3, n4}
                                                                                 OPTIONAL,
cq-TimeDomainAllocationExtension-r17
                                            ENUMERATED {supported}
                                                                                 OPTIONAL
]],
1 1
-- R1 25-20: Propagation delay compensation based on legacy TA procedure for TN and licensed
ta-BasedPDC-TN-NonSharedSpectrumChAccess-r17 ENUMERATED {supported}
                                                                                 OPTIONAL.
-- R1 31-11: Directional Collision Handling in DC operation
directionalCollisionDC-IAB-r17
                                            ENUMERATED {supported}
                                                                                 OPTIONAL
11,
[ [
-- R1 33-6-1: DL priority indication for multicast in DCI
priorityIndicatorInDCI-Multicast-r17
                                            ENUMERATED {supported}
                                                                                 OPTIONAL,
-- R1 33-6-1a: DL priority configuration for SPS multicast
priorityIndicatorInDCI-SPS-Multicast-r17
                                            ENUMERATED {supported}
                                                                                 OPTIONAL,
```

```
-- R1 33-6-2: Two HARO-ACK codebooks simultaneously constructed for supporting HARO-ACK codebooks with different priorities
    -- for unicast and multicast at a UE
    twoHARO-ACK-CodebookForUnicastAndMulticast-r17 ENUMERATED {supported}
                                                                                       OPTIONAL.
    -- R1 33-6-3: More than one PUCCH for HARO-ACK transmission for multicast or for unicast and multicast within a slot
    multiPUCCH-HARO-ACK-ForMulticastUnicast-r17 ENUMERATED {supported}
                                                                                       OPTIONAL.
    srs-AdditionalRepetition-r17
                                                 ENUMERATED {supported}
                                                                                       OPTIONAL,
    pusch-Repetition-CG-SDT-r17
                                                 ENUMERATED {supported}
                                                                                       OPTIONAL
    11
Phy-ParametersCommon-v16a0 ::=
                                                 SEQUENCE {
                                                      ENUMERATED {supported}
    srs-PeriodicityAndOffsetExt-r16
                                                                                       OPTIONAL
Phy-ParametersXDD-Diff ::=
                                     SEQUENCE {
    dynamicSFI
                                         ENUMERATED
                                                     {supported}
                                                                                       OPTIONAL,
                                         ENUMERATED
                                                     {supported}
    twoPUCCH-F0-2-ConsecSymbols
                                                                                       OPTIONAL,
    twoDifferentTPC-Loop-PUSCH
                                         ENUMERATED
                                                    {supported}
                                                                                       OPTIONAL,
    twoDifferentTPC-Loop-PUCCH
                                         ENUMERATED
                                                    {supported}
                                                                                       OPTIONAL,
    . . . ,
    11
    dl-SchedulingOffset-PDSCH-TypeA
                                         ENUMERATED
                                                    {supported}
                                                                                       OPTIONAL,
    dl-SchedulingOffset-PDSCH-TypeB
                                         ENUMERATED
                                                     {supported}
                                                                                       OPTIONAL,
    ul-SchedulingOffset
                                         ENUMERATED {supported}
                                                                                       OPTIONAL
    11
Phy-ParametersFRX-Diff ::=
                                             SEOUENCE {
                                                 ENUMERATED {supported}
    dynamicSFI
                                                                                               OPTIONAL,
    dummy1
                                                 BIT STRING (SIZE (2))
                                                                                               OPTIONAL,
    twoFL-DMRS
                                                 BIT STRING (SIZE (2))
                                                                                               OPTIONAL,
    dummv2
                                                 BIT STRING (SIZE (2))
                                                                                               OPTIONAL,
    dummy3
                                                 BIT STRING (SIZE (2))
                                                                                               OPTIONAL,
    supportedDMRS-TypeDL
                                                 ENUMERATED {type1, type1And2}
                                                                                               OPTIONAL,
    supportedDMRS-TypeUL
                                                 ENUMERATED
                                                             {type1, type1And2}
                                                                                               OPTIONAL,
    semiOpenLoopCSI
                                                 ENUMERATED
                                                             {supported}
                                                                                               OPTIONAL,
    csi-ReportWithoutPMI
                                                 ENUMERATED
                                                             {supported}
                                                                                               OPTIONAL,
    csi-ReportWithoutCOI
                                                 ENUMERATED
                                                             {supported}
                                                                                               OPTIONAL,
                                                             (SIZE (2))
    onePortsPTRS
                                                 BIT STRING
                                                                                               OPTIONAL,
    twoPUCCH-F0-2-ConsecSymbols
                                                 ENUMERATED
                                                             {supported}
                                                                                               OPTIONAL,
    pucch-F2-WithFH
                                                 ENUMERATED
                                                             {supported}
                                                                                               OPTIONAL,
    pucch-F3-WithFH
                                                 ENUMERATED
                                                             {supported}
                                                                                               OPTIONAL,
                                                             {supported}
    pucch-F4-WithFH
                                                 ENUMERATED
                                                                                               OPTIONAL,
                                                             {notSupported
    pucch-F0-2WithoutFH
                                                 ENUMERATED
                                                                                               OPTIONAL,
                                                             {notSupported
    pucch-F1-3-4WithoutFH
                                                 ENUMERATED
                                                                                               OPTIONAL,
    mux-SR-HARQ-ACK-CSI-PUCCH-MultiPerSlot
                                                 ENUMERATED
                                                              supported}
                                                                                               OPTIONAL,
    uci-CodeBlockSegmentation
                                                 ENUMERATED
                                                              supported)
                                                                                               OPTIONAL,
    onePUCCH-LongAndShortFormat
                                                 ENUMERATED
                                                             {supported}
                                                                                               OPTIONAL,
    twoPUCCH-AnyOthersInSlot
                                                 ENUMERATED
                                                             {supported}
                                                                                               OPTIONAL,
    intraSlotFreqHopping-PUSCH
                                                 ENUMERATED
                                                             {supported}
                                                                                               OPTIONAL,
    pusch-LBRM
                                                 ENUMERATED {supported}
                                                                                               OPTIONAL,
    pdcch-BlindDetectionCA
                                                 INTEGER (4..16)
                                                                                               OPTIONAL,
                                                 ENUMERATED {supported}
                                                                                               OPTIONAL,
    tpc-PUSCH-RNTI
    tpc-PUCCH-RNTI
                                                 ENUMERATED {supported}
                                                                                               OPTIONAL,
```

```
{supported}
tpc-SRS-RNTI
                                             ENUMERATED
                                                                                           OPTIONAL,
absoluteTPC-Command
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
twoDifferentTPC-Loop-PUSCH
                                             ENUMERATED
                                                          supported)
                                                                                           OPTIONAL.
twoDifferentTPC-Loop-PUCCH
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
pusch-HalfPi-BPSK
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL.
pucch-F3-4-HalfPi-BPSK
                                                         {supported}
                                             ENUMERATED
                                                                                           OPTIONAL,
almostContiquousCP-OFDM-UL
                                                         {supported}
                                             ENUMERATED
                                                                                           OPTIONAL,
sp-CSI-RS
                                             ENUMERATED
                                                          supported)
                                                                                           OPTIONAL,
sp-CSI-IM
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
tdd-MultiDL-UL-SwitchPerSlot
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
multipleCORESET
                                             ENUMERATED {supported}
                                                                                           OPTIONAL,
. . . ,
11
csi-RS-IM-ReceptionForFeedback
                                             CSI-RS-IM-ReceptionForFeedback
                                                                                           OPTIONAL,
csi-RS-ProcFrameworkForSRS
                                             CSI-RS-ProcFrameworkForSRS
                                                                                           OPTIONAL,
csi-ReportFramework
                                             CSI-ReportFramework
                                                                                           OPTIONAL,
mux-SR-HARO-ACK-CSI-PUCCH-OncePerSlot
                                             SEOUENCE {
    sameSymbol
                                                  ENUMERATED {supported}
                                                                                               OPTIONAL,
                                                  ENUMERATED {supported}
    diffSymbol
                                                                                               OPTIONAL
                                                                                           OPTIONAL,
mux-SR-HARQ-ACK-PUCCH
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
                                                         {supported}
mux-MultipleGroupCtrlCH-Overlap
                                             ENUMERATED
                                                                                           OPTIONAL,
dl-SchedulingOffset-PDSCH-TypeA
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
dl-SchedulingOffset-PDSCH-TypeB
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
ul-SchedulingOffset
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
dl-640AM-MCS-TableAlt
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
ul-640AM-MCS-TableAlt
                                                         {supported}
                                             ENUMERATED
                                                                                           OPTIONAL,
cgi-TableAlt
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
oneFL-DMRS-TwoAdditionalDMRS-UL
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
twoFL-DMRS-TwoAdditionalDMRS-UL
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
oneFL-DMRS-ThreeAdditionalDMRS-UL
                                             ENUMERATED {supported}
                                                                                           OPTIONAL
11,
11
pdcch-BlindDetectionNRDC
                                         SEQUENCE {
    pdcch-BlindDetectionMCG-UE
                                             INTEGER (1..15),
    pdcch-BlindDetectionSCG-UE
                                             INTEGER (1..15)
                                                                                           OPTIONAL,
                                             ENUMERATED {supported}
mux-HARO-ACK-PUSCH-DiffSymbol
                                                                                           OPTIONAL
]],
[ [
-- R1 11-1b: Type 1 HARQ-ACK codebook support for relative TDRA for DL
type1-HARO-ACK-Codebook-r16
                                             ENUMERATED {supported}
                                                                                           OPTIONAL,
-- R1 11-8: Enhanced UL power control scheme
enhancedPowerControl-r16
                                             ENUMERATED {supported}
                                                                                           OPTIONAL,
-- R1 16-1b-1: TCI state activation across multiple CCs
simultaneousTCI-ActMultipleCC-r16
                                             ENUMERATED {supported}
                                                                                           OPTIONAL,
-- R1 16-1b-2: Spatial relation update across multiple CCs
simultaneousSpatialRelationMultipleCC-r16
                                             ENUMERATED {supported}
                                                                                           OPTIONAL,
cli-RSSI-FDM-DL-r16
                                             ENUMERATED
                                                         {supported}
                                                                                           OPTIONAL,
                                             ENUMERATED {supported}
cli-SRS-RSRP-FDM-DL-r16
                                                                                           OPTIONAL,
-- R1 19-3: Maximum MIMO Layer Adaptation
maxLayersMIMO-Adaptation-r16
                                             ENUMERATED {supported}
                                                                                           OPTIONAL,
-- R1 12-5: Configuration of aggregation factor per SPS configuration
                                             ENUMERATED {supported}
aggregationFactorSPS-DL-r16
                                                                                           OPTIONAL,
```

```
-- R1 16-1g: Resources for beam management, pathloss measurement, BFD, RLM and new beam identification
   maxTotalResourcesForOneFreqRange-r16
                                               SEQUENCE {
       maxNumberResWithinSlotAcrossCC-OneFR-r16
                                                   ENUMERATED {n2, n4, n8, n12, n16, n32, n64, n128}
       maxNumberResAcrossCC-OneFR-r16
                                                   ENUMERATED {n2, n4, n8, n12, n16, n32, n40, n48, n64, n72, n80, n96, n128, n256}
                                                                                          OPTIONAL
                                               OPTIONAL.
    -- R1 16-7: Extension of the maximum number of configured aperiodic CSI report settings
                                               CSI-ReportFrameworkExt-r16
    csi-ReportFrameworkExt-r16
                                                                                          OPTIONAL
    ]],
    twoTCI-Act-servingCellInCC-List-r16
                                               ENUMERATED {supported}
                                                                                          OPTIONAL
    11,
    11
    -- R1 22-11: Support of 'cri-RI-CQI' report without non-PMI-PortIndication
    cri-RI-COI-WithoutNon-PMI-PortInd-r16
                                               ENUMERATED {supported}
                                                                                          OPTIONAL
    ]],
    -- R1 25-11: 4-bits subband COI for TN and licensed
    OPTIONAL
    11
                                           SEQUENCE {
Phy-ParametersFR1 ::=
   pdcch-MonitoringSingleOccasion
                                               ENUMERATED {supported}
                                                                                          OPTIONAL,
    scs-60kHz
                                               ENUMERATED {supported}
                                                                                          OPTIONAL,
   pdsch-2560AM-FR1
                                               ENUMERATED {supported}
                                                                                          OPTIONAL,
   pdsch-RE-MappingFR1-PerSymbol
                                               ENUMERATED {n10, n20}
                                                                                          OPTIONAL,
    [ [
   pdsch-RE-MappingFR1-PerSlot
                                               ENUMERATED {n16, n32, n48, n64, n80, n96, n112, n128,
                                               n144, n160, n176, n192, n208, n224, n240, n256}
                                                                                                      OPTIONAL
    ]],
   [ [
    -- R1 22-12: PDCCH monitoring with a single span of three contiguous OFDM symbols that is within the first four OFDM symbols in a
   pdcch-MonitoringSingleSpanFirst4Sym-r16
                                               ENUMERATED {supported}
                                                                                          OPTIONAL
    11
Phy-ParametersFR2 ::=
                                           SEOUENCE {
   dummy
                                               ENUMERATED {supported}
                                                                                                      OPTIONAL,
   pdsch-RE-MappingFR2-PerSymbol
                                               ENUMERATED {n6, n20}
                                                                                                      OPTIONAL,
   11
                                               ENUMERATED {supported}
   pCell-FR2
                                                                                                      OPTIONAL.
                                               ENUMERATED {n16, n32, n48, n64, n80, n96, n112, n128,
   pdsch-RE-MappingFR2-PerSlot
                                                  n144, n160, n176, n192, n208, n224, n240, n256}
                                                                                                      OPTIONAL
    ]],
    1 1
    -- R1 16-1c: Support of default spatial relation and pathloss reference RS for dedicated-PUCCH/SRS and PUSCH
    defaultSpatialRelationPathlossRS-r16
                                               ENUMERATED {supported}
                                                                                                      OPTIONAL,
    -- R1 16-1d: Support of spatial relation update for AP-SRS via MAC CE
    spatialRelationUpdateAP-SRS-r16
                                               ENUMERATED {supported}
                                                                                                      OPTIONAL,
   maxNumberSRS-PosSpatialRelationsAllServingCells-r16 ENUMERATED {n0, n1, n2, n4, n8, n16}
                                                                                                      OPTIONAL
```

```
]]
}
-- TAG-PHY-PARAMETERS-STOP
-- ASN1STOP
```

Phy-ParametersFRX-Diff field descriptions

csi-RS-IM-ReceptionForFeedback/ csi-RS-ProcFrameworkForSRS/ csi-ReportFramework

These fields are optionally present in *fr1-fr2-Add-UE-NR-Capabilities* in *UE-NR-Capability*. They shall not be set in any other instance of the IE *Phy-ParametersFRX-Diff*. If the network configures the UE with serving cells on both FR1 and FR2 bands, these parameters, if present, limit the corresponding parameters in *MIMO-ParametersPerBand*.

Phy-ParametersMRDC

The IE *Phy-ParametersMRDC* is used to convey physical layer capabilities for MR-DC.

Phy-ParametersMRDC information element

```
-- ASN1START
-- TAG-PHY-PARAMETERSMRDC-START
Phy-ParametersMRDC ::=
                                    SEQUENCE {
    naics-Capability-List
                                        SEQUENCE (SIZE (1..maxNrofNAICS-Entries)) OF NAICS-Capability-Entry
                                                                                                                     OPTIONAL,
                                        CarrierAggregationVariant
    spCellPlacement
                                                                                                                    OPTIONAL
    ]],
    -- R1 18-3b: Semi-statically configured LTE UL transmissions in all UL subframes not limited to tdm-pattern in case of TDD PCell
    tdd-PCellUL-TX-AllUL-Subframe-r16 ENUMERATED {supported}
    -- R1 18-3a: Semi-statically configured LTE UL transmissions in all UL subframes not limited to tdm-pattern in case of FDD PCell
    fdd-PCellUL-TX-AllUL-Subframe-r16 ENUMERATED {supported}
                                                                                                                    OPTIONAL
    11
NAICS-Capability-Entry ::=
                                    SEQUENCE {
    numberOfNAICS-CapableCC
                                        INTEGER(1..5),
    numberOfAggregatedPRB
                                        ENUMERATED {n50, n75, n100, n125, n150, n175, n200, n225,
                                                    n250, n275, n300, n350, n400, n450, n500, spare},
-- TAG-PHY-PARAMETERSMRDC-STOP
-- ASN1STOP
```

PHY-ParametersMRDC field descriptions naics-Capability-List Indicates that UE in MR-DC supports NAICS as defined in TS 36.331 [10].

Phy-ParametersSharedSpectrumChAccess

The IE Phy-ParametersSharedSpectrumChAccess is used to convey the physical layer capabilities specific for shared spectrum channel access.

Phy-ParametersSharedSpectrumChAccess information element

```
-- ASN1START
-- TAG-PHY-PARAMETERSSHAREDSPECTRUMCHACCESS-START
Phy-ParametersSharedSpectrumChAccess-r16 ::=
    -- 10-32 (1-2): SS block based SINR measurement (SS-SINR) for unlicensed spectrum
    ss-SINR-Meas-r16
                                                    ENUMERATED {supported}
                                                                                                OPTIONAL,
    -- 10-33 (2-32a): Semi-persistent CSI report on PUCCH for unlicensed spectrum
                                                    ENUMERATED {supported}
    sp-CSI-ReportPUCCH-r16
                                                                                                OPTIONAL,
    -- 10-33a (2-32b): Semi-persistent CSI report on PUSCH for unlicensed spectrum
    sp-CSI-ReportPUSCH-r16
                                                    ENUMERATED {supported}
                                                                                                OPTIONAL,
    -- 10-34 (3-6): Dynamic SFI monitoring for unlicensed spectrum
                                                    ENUMERATED {supported}
    dynamicSFI-r16
                                                                                                OPTIONAL,
    -- 10-35c (4-19c): SR/HARQ-ACK/CSI multiplexing once per slot using a PUCCH (or HARQ-ACK/CSI piggybacked on a PUSCH) when SR/HARQ-
    -- ACK/CSI are supposed to be sent with different starting symbols in a slot for unlicensed spectrum
    -- 10-35 (4-19): SR/HARQ-ACK/CSI multiplexing once per slot using a PUCCH (or HARQ-ACK/CSI piggybacked on a PUSCH) when SR/HARQ-
    -- ACK/CSI are supposed to be sent with the same starting symbol on the PUCCH resources in a slot for unlicensed spectrum
    mux-SR-HARO-ACK-CSI-PUCCH-OncePerSlot-r16
                                                    SEOUENCE {
        sameSymbol-r16
                                                        ENUMERATED {supported}
                                                                                                OPTIONAL,
        diffSymbol-r16
                                                        ENUMERATED {supported}
                                                                                                OPTIONAL
                                                                                                OPTIONAL,
    -- 10-35a (4-19a): Overlapping PUCCH resources have different starting symbols in a slot for unlicensed spectrum
    mux-SR-HARQ-ACK-PUCCH-r16
                                                    ENUMERATED {supported}
                                                                                                OPTIONAL,
    -- 10-35b (4-19b): SR/HARQ-ACK/CSI multiplexing more than once per slot using a PUCCH (or HARQ-ACK/CSI piggybacked on a PUSCH) when
    -- SR/HARQ ACK/CSI are supposed to be sent with the same or different starting symbol in a slot for unlicensed spectrum
    mux-SR-HARQ-ACK-CSI-PUCCH-MultiPerSlot-r16
                                                    ENUMERATED {supported}
                                                                                                OPTIONAL,
    -- 10-36 (4-28): HARQ-ACK multiplexing on PUSCH with different PUCCH/PUSCH starting OFDM symbols for unlicensed spectrum
    mux-HARQ-ACK-PUSCH-DiffSymbol-r16
                                                    ENUMERATED {supported}
    -- 10-37 (4-23): Repetitions for PUCCH format 1, 3, and 4 over multiple slots with K = 2, 4, 8 for unlicensed spectrum
    pucch-Repetition-F1-3-4-r16
                                                    ENUMERATED {supported}
                                                                                                OPTIONAL,
    -- 10-38 (5-14): Type 1 configured PUSCH repetitions over multiple slots for unlicensed spectrum
                                                    ENUMERATED {supported}
    type1-PUSCH-RepetitionMultiSlots-r16
                                                                                                OPTIONAL,
    -- 10-39 (5-16): Type 2 configured PUSCH repetitions over multiple slots for unlicensed spectrum
    type2-PUSCH-RepetitionMultiSlots-r16
                                                    ENUMERATED {supported}
                                                                                                OPTIONAL,
    -- 10-40 (5-17): PUSCH repetitions over multiple slots for unlicensed spectrum
    pusch-RepetitionMultiSlots-r16
                                                    ENUMERATED {supported}
                                                                                                OPTIONAL.
    -- 10-40a (5-17a): PDSCH repetitions over multiple slots for unlicensed spectrum
    pdsch-RepetitionMultiSlots-r16
                                                    ENUMERATED {supported}
                                                                                                OPTIONAL,
    -- 10-41 (5-18): DL SPS
                                                    ENUMERATED {supported}
    downlinkSPS-r16
                                                                                                OPTIONAL,
    -- 10-42 (5-19): Type 1 Configured UL grant
```

PosSRS-RRC-Inactive-OutsideInitialUL-BWP

The IE *PosSRS-RRC-Inactive-OutsideInitialUL-BWP* is used to convey the capabilities supported by the UE for Positioning SRS transmission in RRC_INACTIVE state configured outside initial UL BWP.

PosSRS-RRC-Inactive-OutsideInitialUL-BWP information element

```
-- ASN1START
-- TAG-POSSRS-RRC-INACTIVE-OUTSIDEINITIALUL-BWP-START
PosSRS-RRC-Inactive-OutsideInitialUL-BWP-r17::= SEQUENCE {
    -- R1 27-15b: Positioning SRS transmission in RRC INACTIVE state configured outside initial UL BWP
   maxSRSposBandwidthForEachSCS-withinCC-FR1-r17 ENUMERATED {bw5, bw10, bw15, bw20, bw25, bw30, bw35, bw40,
                                                  bw45, bw50, bw60, bw70, bw80, bw90, bw100}
                                                                                                             OPTIONAL,
   maxSRSposBandwidthForEachSCS-withinCC-FR2-r17 ENUMERATED {bw50, bw100, bw200, bw400}
                                                                                                             OPTIONAL,
                                                  ENUMERATED {n1, n2, n4, n8, n12, n16}
   maxNumOfSRSposResourceSets-r17
                                                                                                             OPTIONAL,
   maxNumOfPeriodicSRSposResources-r17
                                                  ENUMERATED {n1, n2, n4, n8, n16, n32, n64}
                                                                                                             OPTIONAL,
    maxNumOfPeriodicSRSposResourcesPerSlot-r17
                                                  ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}
                                                                                                             OPTIONAL,
    differentNumerologyBetweenSRSposAndInitialBWP-r17 ENUMERATED {supported}
                                                                                                             OPTIONAL,
    srsPosWithoutRestrictionOnBWP-r17
                                                  ENUMERATED {supported}
                                                                                                             OPTIONAL,
   maxNumOfPeriodicAndSemipersistentSRSposResources-r17 ENUMERATED {n1, n2, n4, n8, n16, n32, n64}
                                                                                                             OPTIONAL,
   maxNumOfPeriodicAndSemipersistentSRSposResourcesPerSlot-r17 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14} OPTIONAL,
    OPTIONAL,
                                                  ENUMERATED {us100, us140, us200, us300, us500}
    switchingTimeSRS-TX-OtherTX-r17
                                                                                                             OPTIONAL,
    -- R1 27-15c: Support of positioning SRS transmission in RRC_INACTIVE state outside initial BWP with semi-persistent SRS
   maxNumOfSemiPersistentSRSposResources-r17
                                                 ENUMERATED {n1, n2, n4, n8, n16, n32, n64}
                                                                                                             OPTIONAL,
   maxNumOfSemiPersistentSRSposResourcesPerSlot-r17 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}
                                                                                                             OPTIONAL,
-- TAG-POSSRS-RRC-INACTIVE-OUTSIDEINITIALUL-BWP-STOP
-- ASN1STOP
```

PowSav-Parameters

The IE *PowSav-Parameters* is used to convey the capabilities supported by the UE for the power saving preferences.

PowSav-Parameters information element

```
-- ASN1START
-- TAG-POWSAV-PARAMETERS-START
PowSav-Parameters-r16 ::=
                                  SEQUENCE {
    powSav-ParametersCommon-r16
                                              PowSav-ParametersCommon-r16
                                                                                                                  OPTIONAL,
   powSav-ParametersFRX-Diff-r16
                                              PowSav-ParametersFRX-Diff-r16
                                                                                                                  OPTIONAL,
PowSav-Parameters-v1700 ::=
                                SEOUENCE {
    powSav-ParametersFR2-2-r17
                                    PowSav-ParametersFR2-2-r17
                                                                                                                  OPTIONAL,
PowSav-ParametersCommon-r16 ::=
                                   SEOUENCE {
    drx-Preference-r16
                                              ENUMERATED {supported}
                                                                                                                  OPTIONAL,
   maxCC-Preference-r16
                                              ENUMERATED {supported}
                                                                                                                  OPTIONAL,
                                              ENUMERATED {supported}
   releasePreference-r16
                                                                                                                  OPTIONAL,
    -- R1 19-4a: UE assistance information
   minSchedulingOffsetPreference-r16
                                              ENUMERATED {supported}
                                                                                                                  OPTIONAL,
PowSav-ParametersFRX-Diff-r16 ::=
                                     SEOUENCE {
    maxBW-Preference-r16
                                              ENUMERATED {supported}
                                                                                                                  OPTIONAL,
   maxMIMO-LayerPreference-r16
                                              ENUMERATED {supported}
                                                                                                                  OPTIONAL,
PowSav-ParametersFR2-2-r17 ::=
                                    SEQUENCE {
   maxBW-Preference-r17
                                              ENUMERATED {supported}
                                                                                                                  OPTIONAL,
   maxMIMO-LayerPreference-r17
                                              ENUMERATED {supported}
                                                                                                                  OPTIONAL,
-- TAG-POWSAV-PARAMETERS-STOP
```

ProcessingParameters

-- ASN1STOP

The IE Processing Parameters is used to indicate PDSCH/PUSCH processing capabilities supported by the UE.

ProcessingParameters information element

```
-- ASN1START
-- TAG-PROCESSINGPARAMETERS-START

ProcessingParameters ::= SEQUENCE {
    fallback ENUMERATED {sc, cap1-only},
```

```
differentTB-PerSlot
                                      SEOUENCE {
        upt.o1
                                       NumberOfCarriers
                                                                             OPTIONAL,
        upt.o2
                                        NumberOfCarriers
                                                                             OPTIONAL.
        upto4
                                        NumberOfCarriers
                                                                             OPTIONAL,
        upto7
                                        NumberOfCarriers
                                                                             OPTIONAL
                                                                        OPTIONAL
NumberOfCarriers ::=
                        INTEGER (1..16)
-- TAG-PROCESSINGPARAMETERS-STOP
-- ASN1STOP
```

PRS-ProcessingCapabilityOutsideMGinPPWperType

The IE PRS-Processing Capability Outside MG in PPW per Type is used to indicate DL PRS Processing Capability outside MG capabilities supported by the UE.

PRS-ProcessingCapabilityOutsideMGinPPWperType information element

```
-- ASN1START
-- TAG-PRS-PROCESSINGCAPABILITYOUTSIDEMGINPPWPERType-START
PRS-ProcessingCapabilityOutsideMGinPPWperType-r17 ::= SEQUENCE {
    prsProcessingType-r17
                                                           ENUMERATED {type1A, type1B, type2},
    ppw-dl-PRS-BufferType-r17
                                                           ENUMERATED {type1, type2, ...},
    ppw-durationOfPRS-Processing-r17
                                                           CHOICE {
        ppw-durationOfPRS-Processing1-r17
                                                               SEQUENCE {
            ppw-durationOfPRS-ProcessingSymbolsN-r17
                                                                   ENUMERATED {msDot125, msDot25, msDot5, ms1, ms2, ms4, ms6, ms8, ms12,
                                                                               ms16, ms20, ms25, ms30, ms32, ms35, ms40, ms45, ms50},
            ppw-durationOfPRS-ProcessingSymbolsT-r17
                                                                   ENUMERATED {ms1, ms2, ms4, ms8, ms16, ms20, ms30, ms40, ms80,
                                                                               ms160, ms320, ms640, ms1280}
       ppw-durationOfPRS-Processing2-r17
                                                               SEOUENCE {
            ppw-durationOfPRS-ProcessingSymbolsN2-r17
                                                                   ENUMERATED {msDot125, msDot25, msDot5, ms1, ms2, ms3, ms4, ms5,
                                                                               ms6, ms8, ms12},
            ppw-durationOfPRS-ProcessingSymbolsT2-r17
                                                                   ENUMERATED {ms4, ms5, ms6, ms8}
                                                                                                                                 OPTIONAL,
    ppw-maxNumOfDL-PRS-ResProcessedPerSlot-r17
                                                           SEOUENCE {
       scs15-r17
                                                               ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}
                                                                                                                                 OPTIONAL,
        scs30-r17
                                                               ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}
                                                                                                                                 OPTIONAL,
                                                               ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}
        scs60-r17
                                                                                                                                 OPTIONAL,
                                                               ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}
        scs120-r17
                                                                                                                                 OPTIONAL,
    ppw-maxNumOfDL-Bandwidth-r17
                                                           CHOICE {
        fr1-r17
                                                               ENUMERATED {mhz5, mhz10, mhz20, mhz40, mhz50, mhz80, mhz100},
        fr2-r17
                                                               ENUMERATED {mhz50, mhz100, mhz200, mhz400}
                                                                                                                                 OPTIONAL
```

```
-- TAG-PRS-PROCESSINGCAPABILITYOUTSIDEMGINPPWPERType-STOP
-- ASN1STOP
```

- RAT-Type

The IE RAT-Type is used to indicate the radio access technology (RAT), including NR, of the requested/transferred UE capabilities.

RAT-Type information element

```
-- ASN1START
-- TAG-RAT-TYPE-START

RAT-Type ::= ENUMERATED {nr, eutra-nr, eutra, utra-fdd-v1610, ...}

-- TAG-RAT-TYPE-STOP
-- ASN1STOP
```

RedCapParameters

The IE RedCapParameters is used to indicate the UE capabilities supported by RedCap UEs.

RedCapParameters information element

```
-- ASN1START
-- TAG-REDCAPPARAMETERS-START

RedCapParameters-r17::= SEQUENCE {
    -- R1 28-1: RedCap UE supportOfRedCap-r17 ENUMERATED {supported} OPTIONAL, supportOf16DRB-RedCap-r17 ENUMERATED {supported} OPTIONAL}
}

-- TAG-REDCAPPARAMETERS-STOP
-- ASN1STOP
```

- RF-Parameters

The IE RF-Parameters is used to convey RF-related capabilities for NR operation.

RF-Parameters information element

```
-- ASN1START
-- TAG-RF-PARAMETERS-START
```

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```
RF-Parameters ::=
                                                     SEOUENCE {
    supportedBandListNR
                                                         SEQUENCE (SIZE (1..maxBands)) OF BandNR,
    supportedBandCombinationList
                                                         BandCombinationList.
                                                                                                       OPTIONAL,
    appliedFreqBandListFilter
                                                         FreqBandList
                                                                                                       OPTIONAL,
    . . . ,
    ] ]
    supportedBandCombinationList-v1540
                                                         BandCombinationList-v1540
                                                                                                       OPTIONAL,
    srs-SwitchingTimeRequested
                                                         ENUMERATED {true}
                                                                                                       OPTIONAL
    ]],
                                                         BandCombinationList-v1550
    supportedBandCombinationList-v1550
                                                                                                       OPTIONAL
    ]],
    11
    supportedBandCombinationList-v1560
                                                         BandCombinationList-v1560
                                                                                                       OPTIONAL
    П
    supportedBandCombinationList-v1610
                                                         BandCombinationList-v1610
                                                                                                       OPTIONAL,
    supportedBandCombinationListSidelinkEUTRA-NR-r16
                                                         BandCombinationListSidelinkEUTRA-NR-r16
                                                                                                       OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-r16
                                                         BandCombinationList-UplinkTxSwitch-r16
                                                                                                       OPTIONAL
    ]],
    11
    supportedBandCombinationList-v1630
                                                         BandCombinationList-v1630
                                                                                                       OPTIONAL,
    supportedBandCombinationListSidelinkEUTRA-NR-v1630
                                                         BandCombinationListSidelinkEUTRA-NR-v1630
                                                                                                       OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1630
                                                         BandCombinationList-UplinkTxSwitch-v1630
                                                                                                       OPTIONAL
    ]],
    [ [
                                                         BandCombinationList-v1640
    supportedBandCombinationList-v1640
                                                                                                       OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1640
                                                         BandCombinationList-UplinkTxSwitch-v1640
                                                                                                       OPTIONAL
    ]],
    [ [
    supportedBandCombinationList-v1650
                                                         BandCombinationList-v1650
                                                                                                       OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1650
                                                         BandCombinationList-UplinkTxSwitch-v1650
                                                                                                       OPTIONAL
    ]],
    ] ]
    extendedBand-n77-r16
                                                         ENUMERATED {supported}
                                                                                                       OPTIONAL
    11,
    ] ]
    supportedBandCombinationList-UplinkTxSwitch-v1670
                                                         BandCombinationList-UplinkTxSwitch-v1670
                                                                                                       OPTIONAL
    ]],
    [ [
                                                         BandCombinationList-v1680
    supportedBandCombinationList-v1680
                                                                                                       OPTIONAL
    ]],
    supportedBandCombinationList-v1690
                                                         BandCombinationList-v1690
                                                                                                       OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1690
                                                         BandCombinationList-UplinkTxSwitch-v1690
                                                                                                       OPTIONAL
    ]],
    11
    supportedBandCombinationList-v1700
                                                         BandCombinationList-v1700
                                                                                                       OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1700
                                                         BandCombinationList-UplinkTxSwitch-v1700
                                                                                                       OPTIONAL,
    supportedBandCombinationListSL-RelayDiscovery-r17
                                                         OCTET STRING
                                                                                                       OPTIONAL, -- Contains PC5
BandCombinationListSidelinkNR-r16
    supportedBandCombinationListSL-NonRelayDiscovery-r17 OCTET STRING
                                                                                                       OPTIONAL, -- Contains PC5
BandCombinationListSidelinkNR-r16
    supportedBandCombinationListSidelinkEUTRA-NR-v1710 BandCombinationListSidelinkEUTRA-NR-v1710
                                                                                                       OPTIONAL,
```

```
sidelinkRequested-r17
                                                          ENUMERATED {true}
                                                                                                       OPTIONAL,
    extendedBand-n77-2-r17
                                                         ENUMERATED {supported}
                                                                                                       OPTIONAL
    11.
    ] ]
    supportedBandCombinationList-v1720
                                                          BandCombinationList-v1720
                                                                                                       OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1720
                                                         BandCombinationList-UplinkTxSwitch-v1720
                                                                                                       OPTIONAL
    ]],
    11
    supportedBandCombinationList-v1730
                                                         BandCombinationList-v1730
                                                                                                       OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1730
                                                         BandCombinationList-UplinkTxSwitch-v1730
                                                                                                       OPTIONAL,
    supportedBandCombinationListSL-RelayDiscovery-v1730 BandCombinationListSL-Discovery-r17
                                                                                                       OPTIONAL,
    supportedBandCombinationListSL-NonRelayDiscovery-v1730 BandCombinationListSL-Discovery-r17
                                                                                                       OPTIONAL
    11
RF-Parameters-v15q0 ::=
                                           SECUENCE {
    supportedBandCombinationList-v15q0
                                               BandCombinationList-v15q0
                                                                                            OPTIONAL
RF-Parameters-v16a0 ::=
                                                    SEOUENCE {
    supportedBandCombinationList-v16a0
                                                        BandCombinationList-v16a0
                                                                                                       OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v16a0 BandCombinationList-UplinkTxSwitch-v16a0
                                                                                                       OPTIONAL
BandNR ::=
                                     SEOUENCE {
    bandNR
                                         FreqBandIndicatorNR,
    modifiedMPR-Behaviour
                                         BIT STRING (SIZE (8))
                                                                                          OPTIONAL,
    mimo-ParametersPerBand
                                         MIMO-ParametersPerBand
                                                                                          OPTIONAL,
                                         ENUMERATED {supported}
    extendedCP
                                                                                          OPTIONAL,
    multipleTCI
                                         ENUMERATED
                                                    {supported}
                                                                                          OPTIONAL,
    bwp-WithoutRestriction
                                         ENUMERATED
                                                    {supported}
                                                                                          OPTIONAL,
    bwp-SameNumerology
                                         ENUMERATED {upto2, upto4}
                                                                                          OPTIONAL,
    bwp-DiffNumerology
                                         ENUMERATED
                                                    {upto4}
                                                                                          OPTIONAL,
    crossCarrierScheduling-SameSCS
                                         ENUMERATED
                                                    {supported}
                                                                                          OPTIONAL,
    pdsch-2560AM-FR2
                                         ENUMERATED {supported}
                                                                                          OPTIONAL,
    pusch-256QAM
                                         ENUMERATED {supported}
                                                                                          OPTIONAL,
    ue-PowerClass
                                         ENUMERATED
                                                    {pc1, pc2, pc3, pc4}
                                                                                          OPTIONAL,
                                         ENUMERATED
    rateMatchingLTE-CRS
                                                    {supported}
                                                                                          OPTIONAL,
    channelBWs-DL
                                         CHOICE {
        fr1
                                             SEOUENCE {
            scs-15kHz
                                                 BIT STRING (SIZE (10))
                                                                                               OPTIONAL,
            scs-30kHz
                                                 BIT STRING (SIZE (10))
                                                                                               OPTIONAL,
            scs-60kHz
                                                 BIT STRING (SIZE (10))
                                                                                              OPTIONAL
        },
        fr2
                                             SEOUENCE {
            scs-60kHz
                                                 BIT STRING (SIZE (3))
                                                                                              OPTIONAL,
            scs-120kHz
                                                 BIT STRING (SIZE (3))
                                                                                               OPTIONAL
                                                                                           OPTIONAL,
    channelBWs-UL
                                         CHOICE {
        fr1
                                             SEOUENCE {
            scs-15kHz
                                                 BIT STRING (SIZE (10))
                                                                                              OPTIONAL,
            scs-30kHz
                                                 BIT STRING (SIZE (10))
                                                                                              OPTIONAL,
            scs-60kHz
                                                 BIT STRING (SIZE (10))
                                                                                               OPTIONAL
```

```
},
   fr2
                                         SEOUENCE {
        scs-60kHz
                                             BIT STRING (SIZE (3))
                                                                                          OPTIONAL,
        scs-120kHz
                                             BIT STRING (SIZE (3))
                                                                                          OPTIONAL
                                                                                      OPTIONAL,
. . . ,
Π
maxUplinkDutyCycle-PC2-FR1
                                             ENUMERATED {n60, n70, n80, n90, n100}
                                                                                      OPTIONAL
]],
] ]
pucch-SpatialRelInfoMAC-CE
                                    ENUMERATED {supported}
                                                                                      OPTIONAL,
                                    ENUMERATED {supported}
powerBoosting-pi2BPSK
                                                                                      OPTIONAL
]],
maxUplinkDutyCycle-FR2
                                ENUMERATED {n15, n20, n25, n30, n40, n50, n60, n70, n80, n90, n100}
                                                                                                          OPTIONAL
]],
] ]
channelBWs-DL-v1590
                                    CHOICE {
    fr1
                                         SEQUENCE {
        scs-15kHz
                                             BIT STRING (SIZE (16))
                                                                                  OPTIONAL,
        scs-30kHz
                                             BIT STRING (SIZE (16))
                                                                                  OPTIONAL,
        scs-60kHz
                                             BIT STRING (SIZE (16))
                                                                                  OPTIONAL
    fr2
                                         SEOUENCE {
        scs-60kHz
                                             BIT STRING (SIZE (8))
                                                                                  OPTIONAL,
        scs-120kHz
                                             BIT STRING (SIZE (8))
                                                                                  OPTIONAL
                                                                                  OPTIONAL,
channelBWs-UL-v1590
                                    CHOICE {
   fr1
                                         SEQUENCE {
        scs-15kHz
                                             BIT STRING (SIZE (16))
                                                                                  OPTIONAL,
        scs-30kHz
                                             BIT STRING (SIZE (16))
                                                                                  OPTIONAL,
        scs-60kHz
                                             BIT STRING (SIZE (16))
                                                                                  OPTIONAL
   fr2
                                         SEQUENCE {
        scs-60kHz
                                             BIT STRING (SIZE (8))
                                                                                  OPTIONAL,
        scs-120kHz
                                             BIT STRING (SIZE (8))
                                                                                  OPTIONAL
                                                                                  OPTIONAL
ĺ],
asymmetricBandwidthCombinationSet
                                      BIT STRING (SIZE (1..32))
                                                                           OPTIONAL
]],
11
-- R1 10: NR-unlicensed
sharedSpectrumChAccessParamsPerBand-r16 SharedSpectrumChAccessParamsPerBand-r16 OPTIONAL,
-- R1 11-7b: Independent cancellation of the overlapping PUSCHs in an intra-band UL CA
                                         ENUMERATED {supported}
cancelOverlappingPUSCH-r16
                                                                                  OPTIONAL,
-- R1 14-1: Multiple LTE-CRS rate matching patterns
multipleRateMatchingEUTRA-CRS-r16
                                         SEQUENCE {
   maxNumberPatterns-r16
                                         INTEGER (2..6),
    maxNumberNon-OverlapPatterns-r16
                                        INTEGER (1..3)
                                                                                  OPTIONAL,
```

```
-- R1 14-1a: Two LTE-CRS overlapping rate matching patterns within a part of NR carrier using 15 kHz overlapping with a LTE carrier
overlapRateMatchingEUTRA-CRS-r16
                                         ENUMERATED {supported}
                                                                                  OPTIONAL.
-- R1 14-2: PDSCH Type B mapping of length 9 and 10 OFDM symbols
                                         ENUMERATED {supported}
pdsch-MappingTypeB-Alt-r16
                                                                                  OPTIONAL,
-- R1 14-3: One slot periodic TRS configuration for FR1
oneSlotPeriodicTRS-r16
                                         ENUMERATED {supported}
                                                                                  OPTIONAL,
olpc-SRS-Pos-r16
                                         OLPC-SRS-Pos-r16
                                                                                  OPTIONAL,
spatialRelationsSRS-Pos-r16
                                         SpatialRelationsSRS-Pos-r16
                                                                                  OPTIONAL.
simulSRS-MIMO-TransWithinBand-r16
                                         ENUMERATED {n2}
                                                                                  OPTIONAL,
channelBW-DL-IAB-r16
                                         CHOICE {
    fr1-100mhz
                                             SEQUENCE {
        scs-15kHz
                                                 ENUMERATED {supported}
                                                                                  OPTIONAL.
                                                 ENUMERATED {supported}
       scs-30kHz
                                                                                  OPTIONAL.
        scs-60kHz
                                                 ENUMERATED {supported}
                                                                                  OPTIONAL
    fr2-200mhz
                                         SEOUENCE {
        scs-60kHz
                                             ENUMERATED {supported}
                                                                                  OPTIONAL,
        scs-120kHz
                                             ENUMERATED {supported}
                                                                                  OPTIONAL
                                                                                  OPTIONAL,
channelBW-III.-TAB-r16
                                         CHOICE {
    fr1-100mhz
                                             SEQUENCE {
                                                 ENUMERATED {supported}
        scs-15kHz
                                                                                  OPTIONAL,
        scs-30kHz
                                                 ENUMERATED {supported}
                                                                                  OPTIONAL.
        scs-60kHz
                                                 ENUMERATED {supported}
                                                                                  OPTIONAL
    fr2-200mhz
                                             SEOUENCE {
        scs-60kHz
                                                 ENUMERATED {supported}
                                                                                  OPTIONAL,
        scs-120kHz
                                                 ENUMERATED {supported}
                                                                                  OPTIONAL
                                                                                  OPTIONAL.
rasterShift7dot5-IAB-r16
                                         ENUMERATED {supported}
                                                                                  OPTIONAL,
ue-PowerClass-v1610
                                         ENUMERATED {pcldot5}
                                                                                  OPTIONAL.
condHandover-r16
                                         ENUMERATED {supported}
                                                                                  OPTIONAL,
condHandoverFailure-r16
                                         ENUMERATED {supported}
                                                                                  OPTIONAL.
condHandoverTwoTriggerEvents-r16
                                         ENUMERATED {supported}
                                                                                  OPTIONAL.
condPSCellChange-r16
                                         ENUMERATED
                                                    {supported}
                                                                                  OPTIONAL,
condPSCellChangeTwoTriggerEvents-r16
                                         ENUMERATED
                                                    {supported}
                                                                                  OPTIONAL,
mpr-PowerBoost-FR2-r16
                                         ENUMERATED {supported}
                                                                                  OPTIONAL,
-- R1 11-9: Multiple active configured grant configurations for a BWP of a serving cell
activeConfiguredGrant-r16
                                         SEOUENCE {
maxNumberConfigsPerBWP-r16
                                             ENUMERATED {n1, n2, n4, n8, n12},
maxNumberConfigsAllCC-r16
                                             INTEGER (2..32)
                                                                                  OPTIONAL.
-- R1 11-9a: Joint release in a DCI for two or more configured grant Type 2 configurations for a given BWP of a serving cell
jointReleaseConfiguredGrantType2-r16
                                         ENUMERATED {supported}
                                                                                  OPTIONAL.
-- R1 12-2: Multiple SPS configurations
sps-r16
                                         SEQUENCE {
maxNumberConfigsPerBWP-r16
                                             INTEGER (1..8),
maxNumberConfigsAllCC-r16
                                             INTEGER (2..32)
                                                                                  OPTIONAL,
-- R1 12-2a: Joint release in a DCI for two or more SPS configurations for a given BWP of a serving cell
jointReleaseSPS-r16
                                         ENUMERATED {supported}
                                                                                  OPTIONAL,
```

```
-- R1 13-19: Simultaneous positioning SRS and MIMO SRS transmission within a band across multiple CCs
simulSRS-TransWithinBand-r16
                                        ENUMERATED {n2}
                                                                                 OPTIONAL.
trs-AdditionalBandwidth-r16
                                        ENUMERATED {trs-AddBW-Set1, trs-AddBW-Set2} OPTIONAL.
handoverIntraF-IAB-r16
                                        ENUMERATED {supported}
                                                                                  OPTIONAL
11.
ГΓ
-- R1 22-5a: Simultaneous transmission of SRS for antenna switching and SRS for CB/NCB /BM for intra-band UL CA
-- R1 22-5c: Simultaneous transmission of SRS for antenna switching and SRS for antenna switching for intra-band UL CA
simulTX-SRS-AntSwitchingIntraBandUL-CA-r16 SimulSRS-ForAntennaSwitching-r16
                                                                                         OPTIONAL,
-- R1 10: NR-unlicensed
sharedSpectrumChAccessParamsPerBand-v1630
                                            SharedSpectrumChAccessParamsPerBand-v1630
                                                                                         OPTIONAL
11,
П
handoverUTRA-FDD-r16
                                           ENUMERATED {supported}
                                                                                         OPTIONAL.
-- R4 7-4: Report the shorter transient capability supported by the UE: 2, 4 or 7us
enhancedUL-TransientPeriod-r16
                                           ENUMERATED {us2, us4, us7}
                                                                                         OPTIONAL,
sharedSpectrumChAccessParamsPerBand-v1640 SharedSpectrumChAccessParamsPerBand-v1640
                                                                                         OPTIONAL
]],
[ [
type1-PUSCH-RepetitionMultiSlots-v1650
                                           ENUMERATED {supported}
                                                                                         OPTIONAL,
type2-PUSCH-RepetitionMultiSlots-v1650
                                           ENUMERATED {supported}
                                                                                         OPTIONAL,
                                           ENUMERATED {supported}
pusch-RepetitionMultiSlots-v1650
                                                                                         OPTIONAL,
configuredUL-GrantType1-v1650
                                           ENUMERATED {supported}
                                                                                         OPTIONAL,
                                           ENUMERATED {supported}
configuredUL-GrantType2-v1650
                                                                                         OPTIONAL,
sharedSpectrumChAccessParamsPerBand-v1650 SharedSpectrumChAccessParamsPerBand-v1650
                                                                                         OPTIONAL
11.
] ]
enhancedSkipUplinkTxConfigured-v1660
                                           ENUMERATED {supported}
                                                                                         OPTIONAL,
                                           ENUMERATED {supported}
enhancedSkipUplinkTxDynamic-v1660
                                                                                         OPTIONAL
maxUplinkDutyCycle-PC1dot5-MPE-FR1-r16
                                           ENUMERATED {n10, n15, n20, n25, n30, n40, n50, n60, n70, n80, n90, n100}
                                                                                                                       OPTIONAL,
txDiversity-r16
                                           ENUMERATED {supported}
                                                                                         OPTIONAL
]],
11
-- R1 36-1: Support of 1024QAM for PDSCH for FR1
pdsch-1024QAM-FR1-r17
                                           ENUMERATED {supported}
                                                                                         OPTIONAL,
-- R4 22-1 support of FR2 HST operation
ue-PowerClass-v1700
                                           ENUMERATED {pc5, pc6, pc7}
                                                                                         OPTIONAL,
-- R1 24: NR extension to 71GHz (FR2-2)
fr2-2-AccessParamsPerBand-r17
                                           FR2-2-AccessParamsPerBand-r17
                                                                                         OPTIONAL,
rlm-Relaxation-r17
                                           ENUMERATED {supported}
                                                                                         OPTIONAL,
bfd-Relaxation-r17
                                           ENUMERATED {supported}
                                                                                         OPTIONAL,
                                                      {supported}
cq-SDT-r17
                                           ENUMERATED
                                                                                         OPTIONAL,
locationBasedCondHandover-r17
                                                      {supported}
                                           ENUMERATED
                                                                                         OPTIONAL.
timeBasedCondHandover-r17
                                           ENUMERATED
                                                      {supported}
                                                                                         OPTIONAL.
eventA4BasedCondHandover-r17
                                           ENUMERATED {supported}
                                                                                         OPTIONAL.
mn-InitiatedCondPSCellChangeNRDC-r17
                                           ENUMERATED {supported}
                                                                                         OPTIONAL,
sn-InitiatedCondPSCellChangeNRDC-r17
                                           ENUMERATED {supported}
                                                                                         OPTIONAL,
-- R1 29-3a: PDCCH skipping
pdcch-SkippingWithoutSSSG-r17
                                           ENUMERATED {supported}
                                                                                         OPTIONAL,
-- R1 29-3b: 2 search space sets group switching
sssg-Switching-1BitInd-r17
                                           ENUMERATED {supported}
                                                                                         OPTIONAL,
-- R1 29-3c: 3 search space sets group switching
```

```
ENUMERATED {supported}
sssq-Switching-2BitInd-r17
                                                                                        OPTIONAL,
-- R1 29-3d: 2 search space sets group switching with PDCCH skipping
pdcch-SkippingWithSSSG-r17
                                          ENUMERATED {supported}
                                                                                        OPTIONAL.
-- R1 29-3e: Support Search space set group switching capability 2 for FR1
searchSpaceSetGrp-switchCap2-r17
                                          ENUMERATED {supported}
                                                                                        OPTIONAL.
-- R1 26-1: Uplink Time and Frequency pre-compensation and timing relationship enhancements
uplinkPreCompensation-r17
                                           ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 26-4: UE reporting of information related to TA pre-compensation
uplink-TA-Reporting-r17
                                           ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 26-5: Increasing the number of HARO processes
max-HARQ-ProcessNumber-r17
                                          ENUMERATED {u16d32, u32d16, u32d32}
                                                                                        OPTIONAL,
-- R1 26-6: Type-2 HARQ codebook enhancement
                                           ENUMERATED {supported}
type2-HARQ-Codebook-r17
                                                                                        OPTIONAL,
-- R1 26-6a: Type-1 HARO codebook enhancement
type1-HARO-Codebook-r17
                                          ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 26-6b: Type-3 HARO codebook enhancement
                                          ENUMERATED {supported}
type3-HARO-Codebook-r17
                                                                                        OPTIONAL,
-- R1 26-9: UE-specific K offset
ue-specific-K-Offset-r17
                                          ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 24-1f: Multiple PDSCH scheduling by single DCI for 120kHz in FR2-1
multiPDSCH-SingleDCI-FR2-1-SCS-120kHz-r17 ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 24-1q: Multiple PUSCH scheduling by single DCI for 120kHz in FR2-1
multiPUSCH-SingleDCI-FR2-1-SCS-120kHz-r17 ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R4 14-4: Parallel PRS measurements in RRC INACTIVE state, FR1/FR2 diff
parallelPRS-MeasRRC-Inactive-r17
                                          ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 27-1-2: Support of UE-TxTEGs for UL TDOA
                                          ENUMERATED {n1, n2, n3, n4, n6, n8}
nr-UE-TxTEG-ID-MaxSupport-r17
                                                                                        OPTIONAL,
-- R1 27-17: PRS processing in RRC INACTIVE
prs-ProcessingRRC-Inactive-r17
                                          ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 27-3-2: DL PRS measurement outside MG and in a PRS processing window
prs-ProcessingWindowType1A-r17
                                          ENUMERATED {option1, option2, option3}
                                                                                        OPTIONAL,
prs-ProcessingWindowType1B-r17
                                          ENUMERATED {option1, option2, option3}
                                                                                        OPTIONAL,
prs-ProcessingWindowType2-r17
                                          ENUMERATED {option1, option2, option3}
                                                                                        OPTIONAL,
-- R1 27-15: Positioning SRS transmission in RRC_INACTIVE state for initial UL BWP
srs-AllPosResourcesRRC-Inactive-r17
                                           SRS-AllPosResourcesRRC-Inactive-r17
                                                                                        OPTIONAL,
-- R1 27-16: OLPC for positioning SRS in RRC_INACTIVE state - qNB
olpc-SRS-PosRRC-Inactive-r17
                                          OLPC-SRS-Pos-r16
                                                                                        OPTIONAL,
-- R1 27-19: Spatial relation for positioning SRS in RRC INACTIVE state - qNB
                                          SpatialRelationsSRS-Pos-r16
spatialRelationsSRS-PosRRC-Inactive-r17
                                                                                        OPTIONAL,
-- R1 30-1: Increased maximum number of PUSCH Type A repetitions
                                           ENUMERATED {supported}
maxNumberPUSCH-TypeA-Repetition-r17
                                                                                        OPTIONAL,
-- R1 30-2: PUSCH Type A repetitions based on available slots
puschTypeA-RepetitionsAvailSlot-r17
                                           ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 30-3: TB processing over multi-slot PUSCH
tb-ProcessingMultiSlotPUSCH-r17
                                          ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 30-3a: Repetition of TB processing over multi-slot PUSCH
tb-ProcessingRepMultiSlotPUSCH-r17
                                           ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 30-4: The maximum duration for DM-RS bundling
maxDurationDMRS-Bundling-r17
                                          SEQUENCE {
    fdd-r17
                                              ENUMERATED {n4, n8, n16, n32}
                                                                                        OPTIONAL,
   tdd-r17
                                              ENUMERATED {n2, n4, n8, n16}
                                                                                        OPTIONAL
                                                                                        OPTIONAL,
-- R1 30-6: Repetition of PUSCH transmission scheduled by RAR UL grant and DCI format 0_0 with CRC scrambled by TC-RNTI
                                          ENUMERATED {supported}
pusch-RepetitionMsg3-r17
                                                                                        OPTIONAL,
```

```
sharedSpectrumChAccessParamsPerBand-v1710 SharedSpectrumChAccessParamsPerBand-v1710
-- R4 25-2: Parallel measurements on cells belonging to a different NGSO satellite than a serving satellite without scheduling restrictions
-- on normal operations with the serving cell
parallelMeasurementWithoutRestriction-r17 ENUMERATED {supported}
                                                                                    OPTIONAL,
-- R4 25-5: Parallel measurements on multiple NGSO satellites within a SMTC
maxNumber-NGSO-SatellitesWithinOneSMTC-r17 ENUMERATED {n1, n2, n3, n4}
                                                                                    OPTIONAL,
-- R1 26-10: K1 range extension
k1-RangeExtension-r17
                                        ENUMERATED {supported}
                                                                                    OPTIONAL,
-- R1 35-1: Aperiodic CSI-RS for tracking for fast SCell activation
aperiodicCSI-RS-FastScellActivation-r17
                                       SEQUENCE {
                                            ENUMERATED {n8, n16, n32, n48, n64, n128, n255},
   maxNumberAperiodicCSI-RS-PerCC-r17
   maxNumberAperiodicCSI-RS-AcrossCCs-r17
                                            ENUMERATED {n8, n16, n32, n64, n128, n256, n512, n1024}
                                                                                    OPTIONAL.
-- R1 35-2: Aperiodic CSI-RS bandwidth for tracking for fast SCell activation for 10MHz UE channel bandwidth
OPTIONAL,
-- R1 28-la: RRC-configured DL BWP without CD-SSB or NCD-SSB
                                        ENUMERATED {supported}
bwp-WithoutCD-SSB-OrNCD-SSB-RedCap-r17
                                                                                    OPTIONAL,
-- R1 28-3: Half-duplex FDD operation type A for RedCap UE
                                        ENUMERATED {supported}
halfDuplexFDD-TypeA-RedCap-r17
                                                                                    OPTIONAL,
-- R1 27-15b: Positioning SRS transmission in RRC_INACTIVE state configured outside initial UL BWP
posSRS-RRC-Inactive-OutsideInitialUL-BWP-r17 PosSRS-RRC-Inactive-OutsideInitialUL-BWP-r17 OPTIONAL,
-- R4 15-3 UE support of CBW for 480kHz SCS
channelBWs-DL-SCS-480kHz-FR2-2-r17
                                        BIT STRING (SIZE (8))
                                                                                    OPTIONAL,
channelBWs-UL-SCS-480kHz-FR2-2-r17
                                        BIT STRING (SIZE (8))
                                                                                    OPTIONAL,
-- R4 15-4 UE support of CBW for 960kHz SCS
channelBWs-DL-SCS-960kHz-FR2-2-r17
                                        BIT STRING (SIZE (8))
                                                                                    OPTIONAL,
                                        BIT STRING (SIZE (8))
channelBWs-UL-SCS-960kHz-FR2-2-r17
                                                                                    OPTIONAL,
-- R4 17-1 UL gap for Tx power management
                                        ENUMERATED {supported}
ul-GapFR2-r17
                                                                                    OPTIONAL,
-- R1 25-4: One-shot HARO ACK feedback triggered by DCI format 1 2
oneShotHARQ-feedbackTriggeredByDCI-1-2-r17 ENUMERATED {supported}
                                                                                    OPTIONAL,
-- R1 25-5: PHY priority handling for one-shot HARQ ACK feedback
oneShotHARQ-feedbackPhy-Priority-r17
                                        ENUMERATED {supported}
                                                                                    OPTIONAL,
-- R1 25-6: Enhanced type 3 HARQ-ACK codebook feedback
enhancedType3-HARQ-CodebookFeedback-r17
                                        SEOUENCE {
   enhancedType3-HARQ-Codebooks-r17
                                            ENUMERATED {n1, n2, n4, n8},
   maxNumberPUCCH-Transmissions-r17
                                            ENUMERATED {n1, n2, n3, n4, n5, n6, n7}
                                                                                    OPTIONAL,
-- R1 25-7: Triggered HARO-ACK codebook re-transmission
triggeredHARO-CodebookRetx-r17
                                          SEQUENCE {
   minHARQ-Retx-Offset-r17
                                              ENUMERATED \{n-7, n-5, n-3, n-1, n1\},
   maxHARO-Retx-Offset-r17
                                              ENUMERATED {n4, n6, n8, n10, n12, n14, n16, n18, n20, n22, n24}
                                                                                    OPTIONAL
]],
-- R4 22-2 support of one shot large UL timing adjustment
ue-OneShotUL-TimingAdi-r17
                                                ENUMERATED {supported}
                                                                                    OPTIONAL,
-- R1 25-2: Repetitions for PUCCH format 0, and 2 over multiple slots with K = 2, 4, 8
pucch-Repetition-F0-2-r17
                                                ENUMERATED {supported}
                                                                                    OPTIONAL,
-- R1 25-11a: 4-bits subband CQI for NTN and unlicensed
OPTIONAL,
-- R1 25-16: HARO-ACK with different priorities multiplexing on a PUCCH/PUSCH
mux-HARQ-ACK-DiffPriorities-r17
                                                ENUMERATED {supported}
                                                                                    OPTIONAL,
-- R1 25-20a: Propagation delay compensation based on legacy TA procedure for NTN and unlicensed
```

```
ta-BasedPDC-NTN-SharedSpectrumChAccess-r17
                                                  ENUMERATED {supported}
                                                                                        OPTIONAL.
-- R1 33-2b: DCI-based enabling/disabling ACK/NACK-based feedback for dynamic scheduling for multicast
ack-NACK-FeedbackForMulticastWithDCI-Enabler-r17 ENUMERATED {supported}
                                                                                        OPTIONAL.
-- R1 33-2e: Multiple G-RNTIs for group-common PDSCHs
maxNumberG-RNTI-r17
                                                  INTEGER (2..8)
                                                                                        OPTIONAL.
-- R1 33-2f: Dynamic multicast with DCI format 4 2
dynamicMulticastDCI-Format4-2-r17
                                                  ENUMERATED {supported}
                                                                                        OPTIONAL.
-- R1 33-2i: Supported maximal modulation order for multicast PDSCH
maxModulationOrderForMulticast-r17
                                                  CHOICE {
                                                      ENUMERATED {gam256, gam1024},
    fr1-r17
    fr2-r17
                                                      ENUMERATED {gam64, gam256}
                                                                                                                            OPTIONAL,
-- R1 33-3-1: Dynamic Slot-level repetition for group-common PDSCH for TN and licensed
dynamicSlotRepetitionMulticastTN-NonSharedSpectrumChAccess-r17 ENUMERATED {n8, n16}
                                                                                                                            OPTIONAL,
-- R1 33-3-la: Dynamic Slot-level repetition for group-common PDSCH for NTN and unlicensed
dynamicSlotRepetitionMulticastNTN-SharedSpectrumChAccess-r17
                                                                 ENUMERATED {n8, n16}
                                                                                                                            OPTIONAL,
-- R1 33-4-1: DCI-based enabling/disabling NACK-only based feedback for dynamic scheduling for multicast
nack-OnlyFeedbackForMulticastWithDCI-Enabler-r17
                                                                 ENUMERATED {supported}
                                                                                                                            OPTIONAL,
-- R1 33-5-1b: DCI-based enabling/disabling ACK/NACK-based feedback for dynamic scheduling for multicast
                                                                 ENUMERATED {supported}
ack-NACK-FeedbackForSPS-MulticastWithDCI-Enabler-r17
                                                                                                                            OPTIONAL,
-- R1 33-5-1h: Multiple G-CS-RNTIs for SPS group-common PDSCHs
maxNumberG-CS-RNTI-r17
                                                                INTEGER (2..8)
                                                                                                                            OPTIONAL,
-- R1 33-10: Support group-common PDSCH RE-level rate matching for multicast
re-LevelRateMatchingForMulticast-r17
                                                                 ENUMERATED {supported}
                                                                                                                            OPTIONAL.
-- R1 36-1a: Support of 10240AM for PDSCH with maximum 2 MIMO layers for FR1
pdsch-1024QAM-2MIMO-FR1-r17
                                                                ENUMERATED {supported}
                                                                                                                            OPTIONAL,
-- R4 14-3 PRS measurement without MG
prs-MeasurementWithoutMG-r17
                                                                ENUMERATED {cpLength, quarterSymbol, halfSymbol, halfSlot} OPTIONAL,
-- R4 25-7: The number of target LEO satellites the UE can monitor per carrier
maxNumber-LEO-SatellitesPerCarrier-r17
                                                                INTEGER (3..4)
                                                                                                                            OPTIONAL,
-- R1 27-3-3 DL PRS Processing Capability outside MG - buffering capability
prs-ProcessingCapabilityOutsideMGinPPW-r17 SEQUENCE (SIZE(1..3)) OF PRS-ProcessingCapabilityOutsideMGinPPWperType-r17
                                                                                                                            OPTIONAL,
-- R1 27-15a: Positioning SRS transmission in RRC_INACTIVE state for initial UL BWP with semi-persistent SRS
srs-SemiPersistent-PosResourcesRRC-Inactive-r17
                                                                SEQUENCE {
    maxNumOfSemiPersistentSRSposResources-r17
                                                                     ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
    maxNumOfSemiPersistentSRSposResourcesPerSlot-r17
                                                                     ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}
                                                                                                                            OPTIONAL,
-- R2: UE support of CBW for 120kHz SCS
channelBWs-DL-SCS-120kHz-FR2-2-r17
                                                                BIT STRING (SIZE (8))
                                                                                                                            OPTIONAL,
channelBWs-UL-SCS-120kHz-FR2-2-r17
                                                                BIT STRING (SIZE (8))
                                                                                                                            OPTIONAL
]],
[ [
-- R1 30-4a: DM-RS bundling for PUSCH repetition type A
                                                                 ENUMERATED {supported}
dmrs-BundlingPUSCH-RepTypeA-r17
                                                                                                                            OPTIONAL,
-- R1 30-4b: DM-RS bundling for PUSCH repetition type B
dmrs-BundlingPUSCH-RepTypeB-r17
                                                                ENUMERATED {supported}
                                                                                                                            OPTIONAL,
-- R1 30-4c: DM-RS bundling for TB processing over multi-slot PUSCH
dmrs-BundlingPUSCH-multiSlot-r17
                                                                 ENUMERATED {supported}
                                                                                                                            OPTIONAL,
-- R1 30-4d: DMRS bundling for PUCCH repetitions
dmrs-BundlingPUCCH-Rep-r17
                                                                ENUMERATED {supported}
                                                                                                                            OPTIONAL,
-- R1 30-4e: Enhanced inter-slot frequency hopping with inter-slot bundling for PUSCH
interSlotFreqHopInterSlotBundlingPUSCH-r17
                                                                 ENUMERATED {supported}
                                                                                                                            OPTIONAL,
-- R1 30-4f: Enhanced inter-slot frequency hopping for PUCCH repetitions with DMRS bundling
                                                                 ENUMERATED {supported}
interSlotFreqHopPUCCH-r17
                                                                                                                            OPTIONAL,
```

```
-- R1 30-4g: Restart DM-RS bundling
dmrs-BundlingRestart-r17
-- R1 30-4h: DM-RS bundling for non-back-to-back transmission
dmrs-BundlingNonBackToBackTX-r17

[]
ENUMERATED {supported}
ENUMERATED {supported}
OPTIONAL
```

-- TAG-RF-PARAMETERS-STOP

-- ASN1STOP

RF-Parameters field descriptions

appliedFreqBandListFilter

In this field the UE mirrors the FreqBandList that the NW provided in the capability enquiry, if any. The UE filtered the band combinations in the supportedBandCombinationList in accordance with this appliedFreqBandListFilter. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field eutra-nr-only [10].

supportedBandCombinationList

A list of band combinations that the UE supports for NR (and NR-DC, if requested). The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-NR-Capability* IE. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field *eutra-nr-only* [10].

supportedBandCombinationListSidelinkEUTRA-NR

A list of band combinations that the UE supports for NR sidelink communication only, for joint NR sidelink communication and V2X sidelink communication, or for V2X sidelink communication only. The UE does not include this field if the UE capability is requested by E-UTRAN (see TS 36.331[10]) and the network request includes the field *eutra-nr-only*.

supportedBandCombinationListSL-NonRelayDiscovery

A list of band combinations that the UE supports for NR sidelink non-relay discovery. The encoding is defined in PC5 BandCombinationListSidelinkNR-r16.

supportedBandCombinationListSL-RelayDiscovery

A list of band combinations that the UE supports for NR sidelink relay discovery. The encoding is defined in PC5 BandCombinationListSidelinkNR-r16.

supportedBandCombinationList-UplinkTxSwitch

A list of band combinations that the UE supports dynamic uplink Tx switching for NR UL CA and SUL. The FeatureSetCombinationId:s in this list refer to the FeatureSetCombination entries in the featureSetCombinations list in the UE-NR-Capability IE. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field eutra-nr-only [10].

RF-ParametersMRDC

The IE RF-ParametersMRDC is used to convey RF related capabilities for MR-DC.

RF-ParametersMRDC information element

```
-- ASN1START
-- TAG-RF-PARAMETERSMRDC-START

RF-ParametersMRDC ::= SEQUENCE {
    supportedBandCombinationList BandCombinationList OPTIONAL,
    appliedFreqBandListFilter FreqBandList OPTIONAL,
    [[
```

```
ENUMERATED {true}
srs-SwitchingTimeRequested
                                                                                          OPTIONAL,
supportedBandCombinationList-v1540
                                        BandCombinationList-v1540
                                                                                          OPTIONAL
11.
] ]
supportedBandCombinationList-v1550
                                         BandCombinationList-v1550
                                                                                          OPTIONAL
]],
[ [
supportedBandCombinationList-v1560
                                        BandCombinationList-v1560
                                                                                          OPTIONAL,
supportedBandCombinationListNEDC-Only
                                        BandCombinationList
                                                                                          OPTIONAL
] ]
supportedBandCombinationList-v1570
                                         BandCombinationList-v1570
                                                                                          OPTIONAL
11,
П
supportedBandCombinationList-v1580
                                        BandCombinationList-v1580
                                                                                          OPTIONAL
]],
supportedBandCombinationList-v1590
                                        BandCombinationList-v1590
                                                                                          OPTIONAL
]],
11
supportedBandCombinationListNEDC-Only-v15a0
                                                SEQUENCE {
    supportedBandCombinationList-v1540
                                             BandCombinationList-v1540
                                                                                          OPTIONAL,
    supportedBandCombinationList-v1560
                                             BandCombinationList-v1560
                                                                                          OPTIONAL,
    supportedBandCombinationList-v1570
                                             BandCombinationList-v1570
                                                                                          OPTIONAL,
    supportedBandCombinationList-v1580
                                             BandCombinationList-v1580
                                                                                          OPTIONAL,
    supportedBandCombinationList-v1590
                                             BandCombinationList-v1590
                                                                                          OPTIONAL
                                                                                          OPTIONAL
ĺ],
[ [
supportedBandCombinationList-v1610
                                        BandCombinationList-v1610
                                                                                          OPTIONAL,
supportedBandCombinationListNEDC-Only-v1610 BandCombinationList-v1610
                                                                                          OPTIONAL,
supportedBandCombinationList-UplinkTxSwitch-r16 BandCombinationList-UplinkTxSwitch-r16 OPTIONAL
]],
] ]
                                                     BandCombinationList-v1630
supportedBandCombinationList-v1630
                                                                                                  OPTIONAL.
supportedBandCombinationListNEDC-Only-v1630
                                                     BandCombinationList-v1630
                                                                                                  OPTIONAL,
supportedBandCombinationList-UplinkTxSwitch-v1630
                                                     BandCombinationList-UplinkTxSwitch-v1630
                                                                                                  OPTIONAL
]],
[ [
supportedBandCombinationList-v1640
                                                     BandCombinationList-v1640
                                                                                                  OPTIONAL,
supportedBandCombinationListNEDC-Only-v1640
                                                     BandCombinationList-v1640
                                                                                                  OPTIONAL,
supportedBandCombinationList-UplinkTxSwitch-v1640
                                                     BandCombinationList-UplinkTxSwitch-v1640
                                                                                                  OPTIONAL
]],
[ [
                                                     BandCombinationList-UplinkTxSwitch-v1670
supportedBandCombinationList-UplinkTxSwitch-v1670
                                                                                                  OPTIONAL
]],
supportedBandCombinationList-v1700
                                                     BandCombinationList-v1700
                                                                                                  OPTIONAL,
supportedBandCombinationList-UplinkTxSwitch-v1700
                                                     BandCombinationList-UplinkTxSwitch-v1700
                                                                                                  OPTIONAL
]],
[ [
supportedBandCombinationList-v1720
                                                     BandCombinationList-v1720
                                                                                                  OPTIONAL,
supportedBandCombinationListNEDC-Only-v1720
                                                     SEOUENCE
    supportedBandCombinationList-v1700
                                                         BandCombinationList-v1700
                                                                                                  OPTIONAL,
```

```
supportedBandCombinationList-v1720
                                                             BandCombinationList-v1720
                                                                                                      OPTIONAL
                                                                                                      OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1720
                                                         BandCombinationList-UplinkTxSwitch-v1720
                                                                                                      OPTIONAL
    [ [
                                                         BandCombinationList-v1730
    supportedBandCombinationList-v1730
                                                                                                      OPTIONAL,
    supportedBandCombinationListNEDC-Only-v1730
                                                         BandCombinationList-v1730
                                                                                                      OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1730
                                                         BandCombinationList-UplinkTxSwitch-v1730
                                                                                                      OPTIONAL
RF-ParametersMRDC-v15g0 ::=
                                                SEOUENCE {
    supportedBandCombinationList-v15q0
                                                    BandCombinationList-v15q0
                                                                                     OPTIONAL.
    supportedBandCombinationListNEDC-Only-v15q0
                                                    BandCombinationList-v15q0
                                                                                     OPTIONAL
-- TAG-RF-PARAMETERSMRDC-STOP
-- ASN1STOP
```

RF-ParametersMRDC field descriptions

appliedFreqBandListFilter

In this field the UE mirrors the FreqBandList that the NW provided in the capability enquiry, if any. The UE filtered the band combinations in the supportedBandCombinationList in accordance with this appliedFreqBandListFilter.

supportedBandCombinationList

A list of band combinations that the UE supports for (NG)EN-DC, or both (NG)EN-DC and NE-DC. The FeatureSetCombinationId:s in this list refer to the FeatureSetCombination entries in the featureSetCombinations list in the UE-MRDC-Capability IE.

supportedBandCombinationListNEDC-Only, supportedBandCombinationListNEDC-Only-v1610

A list of band combinations that the UE supports only for NE-DC. The FeatureSetCombinationId:s in this list refer to the FeatureSetCombination entries in the featureSetCombinations list in the UE-MRDC-Capability IE.

supportedBandCombinationList-UplinkTxSwitch

A list of band combinations that the UE supports dynamic UL Tx switching for (NG)EN-DC. The FeatureSetCombinationId:s in this list refer to the FeatureSetCombination entries in the featureSetCombinations list in the UE-MRDC-Capability IE.

- RLC-Parameters

The IE *RLC-Parameters* is used to convey capabilities related to RLC.

RLC-Parameters information element

SDAP-Parameters

The IE SDAP-Parameters is used to convey capabilities related to SDAP.

SDAP-Parameters information element

SidelinkParameters

The IE SidelinkParameters is used to convey capabilities related to NR and V2X sidelink communications.

SidelinkParameters information element

OPTIONAL,

```
rlc-ParametersSidelink-r16
                                               RLC-ParametersSidelink-r16
                                                                                                                           OPTIONAL,
    mac-ParametersSidelink-r16
                                              MAC-ParametersSidelink-r16
                                                                                                                           OPTIONAL,
    fdd-Add-UE-Sidelink-Capabilities-r16
                                               UE-SidelinkCapabilitvAddXDD-Mode-r16
                                                                                                                           OPTIONAL.
    tdd-Add-UE-Sidelink-Capabilities-r16
                                               UE-SidelinkCapabilityAddXDD-Mode-r16
                                                                                                                           OPTIONAL,
    supportedBandListSidelink-r16
                                               SEQUENCE (SIZE (1..maxBands)) OF BandSidelink-r16
                                                                                                                           OPTIONAL,
    [ [
    relavParameters-r17
                                               RelayParameters-r17
                                                                                                                           OPTIONAL
    11,
    -- R1 32-x: Use of new P0 parameters for open loop power control
                                               ENUMERATED {supported}
    p0-OLPC-Sidelink-r17
                                                                                                                           OPTIONAL
    11
SidelinkParametersEUTRA-r16 ::= SEQUENCE {
    sl-ParametersEUTRA1-r16
                                                                                                                           OPTIONAL,
                                               OCTET STRING
    sl-ParametersEUTRA2-r16
                                               OCTET STRING
                                                                                                                           OPTIONAL,
    sl-ParametersEUTRA3-r16
                                               OCTET STRING
                                                                                                                           OPTIONAL,
    supportedBandListSidelinkEUTRA-r16
                                               SEQUENCE (SIZE (1..maxBandsEUTRA)) OF BandSidelinkEUTRA-r16
                                                                                                                           OPTIONAL,
RLC-ParametersSidelink-r16 ::= SEOUENCE {
    am-WithLongSN-Sidelink-r16
                                               ENUMERATED {supported}
                                                                                                                           OPTIONAL,
    um-WithLongSN-Sidelink-r16
                                               ENUMERATED {supported}
                                                                                                                           OPTIONAL,
    . . .
MAC-ParametersSidelink-r16 ::= SEQUENCE {
    mac-ParametersSidelinkCommon-r16
                                               MAC-ParametersSidelinkCommon-r16
                                                                                                                           OPTIONAL,
    mac-ParametersSidelinkXDD-Diff-r16
                                               MAC-ParametersSidelinkXDD-Diff-r16
                                                                                                                           OPTIONAL,
    . . .
UE-SidelinkCapabilityAddXDD-Mode-r16 ::= SEQUENCE {
                                               MAC-ParametersSidelinkXDD-Diff-r16
    mac-ParametersSidelinkXDD-Diff-r16
                                                                                                                           OPTIONAL
MAC-ParametersSidelinkCommon-r16 ::= SEOUENCE
    lcp-RestrictionSidelink-r16
                                               ENUMERATED {supported}
                                                                                                                           OPTIONAL,
    multipleConfiguredGrantsSidelink-r16
                                               ENUMERATED {supported}
                                                                                                                           OPTIONAL,
    Π
    drx-OnSidelink-r17
                                               ENUMERATED {supported}
                                                                                                                           OPTIONAL
    11
MAC-ParametersSidelinkXDD-Diff-r16 ::= SEQUENCE {
    multipleSR-ConfigurationsSidelink-r16
                                               ENUMERATED {supported}
                                                                                                                           OPTIONAL,
    logicalChannelSR-DelayTimerSidelink-r16
                                              ENUMERATED {supported}
                                                                                                                           OPTIONAL,
    . . .
```

OPTIONAL.

OPTIONAL

```
BandSidelinkEUTRA-r16 ::=
                                         SEOUENCE {
    fregBandSidelinkEUTRA-r16
                                             FregBandIndicatorEUTRA,
    -- R1 15-7: Transmitting LTE sidelink mode 3 scheduled by NR Uu
    gnb-ScheduledMode3SidelinkEUTRA-r16
                                             SEOUENCE {
        qnb-ScheduledMode3DelaySidelinkEUTRA-r16 ENUMERATED {ms0, ms0dot25, ms0dot5, ms0dot625, ms0dot75, ms1,
                                                              ms1dot25, ms1dot5, ms1dot75, ms2, ms2dot5, ms3, ms4,
                                                              ms5, ms6, ms8, ms10, ms20}
    -- R1 15-9: Transmitting LTE sidelink mode 4 configured by NR Uu
    gnb-ScheduledMode4SidelinkEUTRA-r16
                                             ENUMERATED {supported}
BandSidelink-r16 ::= SEQUENCE {
    fregBandSidelink-r16
                                                   FreqBandIndicatorNR,
    --15-1
    sl-Reception-r16
                                                   SEOUENCE {
        harg-RxProcessSidelink-r16
                                                       ENUMERATED {n16, n24, n32, n48, n64},
        pscch-RxSidelink-r16
                                                       ENUMERATED {value1, value2},
        scs-CP-PatternRxSidelink-r16
                                                       CHOICE {
                                                           SEQUENCE {
            fr1-r16
                scs-15kHz-r16
                                                               BIT STRING (SIZE (16))
                                                                                                      OPTIONAL,
                scs-30kHz-r16
                                                               BIT STRING (SIZE (16))
                                                                                                      OPTIONAL,
                scs-60kHz-r16
                                                               BIT STRING (SIZE (16))
                                                                                                      OPTIONAL
            fr2-r16
                                                           SEOUENCE {
                scs-60kHz-r16
                                                               BIT STRING (SIZE (16))
                                                                                                      OPTIONAL,
                scs-120kHz-r16
                                                               BIT STRING (SIZE (16))
                                                                                                      OPTIONAL
                                                                                                      OPTIONAL,
        extendedCP-RxSidelink-r16
                                                       ENUMERATED {supported}
                                                                                                      OPTIONAL
                                                                                                      OPTIONAL,
    --15-2
    sl-TransmissionModel-r16
                                                   SEQUENCE {
        harq-TxProcessModeOneSidelink-r16
                                                       ENUMERATED {n8, n16},
        scs-CP-PatternTxSidelinkModeOne-r16
                                                       CHOICE {
            fr1-r16
                                                           SEQUENCE {
                scs-15kHz-r16
                                                               BIT STRING (SIZE (16))
                                                                                                      OPTIONAL,
                scs-30kHz-r16
                                                               BIT STRING (SIZE (16))
                                                                                                      OPTIONAL,
                scs-60kHz-r16
                                                                                                      OPTIONAL
                                                               BIT STRING (SIZE (16))
            fr2-r16
                                                           SEOUENCE {
                scs-60kHz-r16
                                                               BIT STRING (SIZE (16))
                                                                                                      OPTIONAL,
                scs-120kHz-r16
                                                               BIT STRING (SIZE (16))
                                                                                                      OPTIONAL
        extendedCP-TxSidelink-r16
                                                       ENUMERATED {supported}
                                                                                                      OPTIONAL,
        harg-ReportOnPUCCH-r16
                                                       ENUMERATED {supported}
                                                                                                      OPTIONAL
                                                                                                      OPTIONAL,
    --15-4
    sync-Sidelink-r16
                                                   SEOUENCE {
                                                       ENUMERATED {supported}
        qNB-Sync-r16
                                                                                                      OPTIONAL,
        gNB-GNSS-UE-SyncWithPriorityOnGNB-ENB-r16
                                                       ENUMERATED {supported}
                                                                                                      OPTIONAL,
        gNB-GNSS-UE-SyncWithPriorityOnGNSS-r16
                                                       ENUMERATED {supported}
                                                                                                      OPTIONAL
                                                                                                      OPTIONAL,
```

```
--15-10
sl-Tx-2560AM-r16
                                               ENUMERATED {supported}
                                                                                                   OPTIONAL,
--15-11
psfch-FormatZeroSidelink-r16
                                               SEOUENCE {
   psfch-RxNumber
                                                   ENUMERATED {n5, n15, n25, n32, n35, n45, n50, n64},
   psfch-TxNumber
                                                   ENUMERATED {n4, n8, n16}
                                                                                                   OPTIONAL,
--15-12
lowSE-64QAM-MCS-TableSidelink-r16
                                               ENUMERATED {supported}
                                                                                                   OPTIONAL,
--15-15
enb-sync-Sidelink-r16
                                               ENUMERATED {supported}
                                                                                                   OPTIONAL,
. . . ,
ГΓ
--15-3
sl-TransmissionMode2-r16
                                               SEOUENCE {
   harg-TxProcessModeTwoSidelink-r16
                                                    ENUMERATED {n8, n16},
    scs-CP-PatternTxSidelinkModeTwo-r16
                                                   ENUMERATED {supported}
                                                                                                   OPTIONAL,
                                                   ENUMERATED {supported}
   dl-openLoopPC-Sidelink-r16
                                                                                                   OPTIONAL
                                                                                                   OPTIONAL,
--15-5
congestionControlSidelink-r16
                                               SEQUENCE {
    cbr-ReportSidelink-r16
                                                   ENUMERATED {supported}
                                                                                                   OPTIONAL,
   cbr-CR-TimeLimitSidelink-r16
                                                   ENUMERATED {time1, time2}
                                                                                                   OPTIONAL.
--15-22
fewerSymbolSlotSidelink-r16
                                               ENUMERATED {supported}
                                                                                                   OPTIONAL,
--15-23
sl-openLoopPC-RSRP-ReportSidelink-r16
                                               ENUMERATED {supported}
                                                                                                   OPTIONAL,
--13-1
sl-Rx-2560AM-r16
                                               ENUMERATED {supported}
                                                                                                   OPTIONAL
11,
] ]
ue-PowerClassSidelink-r16
                                                   ENUMERATED {pc2, pc3, spare6, spare5, spare4, spare3, spare2, spare1}
                                                                                                                    OPTIONAL
11,
11
--32-4a
sl-TransmissionMode2-RandomResourceSelection-r17 SEQUENCE {
   harg-TxProcessModeTwoSidelink-r17
                                                   ENUMERATED {n8, n16},
    scs-CP-PatternTxSidelinkModeTwo-r17
                                                       CHOICE
        fr1-r17
                                                           SEQUENCE {
            scs-15kHz-r17
                                                               BIT STRING (SIZE (16))
                                                                                                   OPTIONAL,
            scs-30kHz-r17
                                                               BIT STRING (SIZE (16))
                                                                                                   OPTIONAL,
            scs-60kHz-r17
                                                                                                   OPTIONAL
                                                               BIT STRING (SIZE (16))
        fr2-r17
                                                           SEQUENCE {
            scs-60kHz-r17
                                                               BIT STRING (SIZE (16))
                                                                                                   OPTIONAL.
            scs-120kHz-r17
                                                               BIT STRING (SIZE (16))
                                                                                                   OPTIONAL
                                                                                                   OPTIONAL,
    extendedCP-Mode2Random-r17
                                                   ENUMERATED {supported}
                                                                                                   OPTIONAL,
    dl-openLoopPC-Sidelink-r17
                                                   ENUMERATED {supported}
                                                                                                       OPTIONAL
                                                                                                   OPTIONAL,
--32-4b
```

```
sync-Sidelink-v1710
                                                   SEOUENCE {
        sync-GNSS-r17
                                                       ENUMERATED
                                                                  {supported}
                                                                                                       OPTIONAL,
        qNB-Svnc-r17
                                                       ENUMERATED
                                                                  {supported}
                                                                                                      OPTIONAL,
        qNB-GNSS-UE-SyncWithPriorityOnGNB-ENB-r17
                                                       ENUMERATED
                                                                  {supported}
                                                                                                      OPTIONAL,
        gNB-GNSS-UE-SyncWithPriorityOnGNSS-r17
                                                       ENUMERATED {supported}
                                                                                                       OPTIONAL
                                                                                                       OPTIONAL,
    --32-4c
                                                   ENUMERATED {supported}
    enb-svnc-Sidelink-v1710
                                                                                                       OPTIONAL.
    --32-5a-2
                                                   ENUMERATED {supported}
    rx-IUC-Schemel-PreferredMode2Sidelink-r17
                                                                                                       OPTIONAL,
    --32-5a-3
                                                   ENUMERATED {supported}
    rx-IUC-Schemel-NonPreferredMode2Sidelink-r17
                                                                                                       OPTIONAL,
    --32-5b-2
    rx-IUC-Scheme2-Mode2Sidelink-r17
                                                   ENUMERATED {n5, n15, n25, n32, n35, n45, n50, n64} OPTIONAL,
    --32-6-1
    rx-IUC-Schemel-SCI-r17
                                                   ENUMERATED {supported}
                                                                                                       OPTIONAL,
    --32-6-2
                                                   ENUMERATED {supported}
    rx-IUC-Schemel-SCI-ExplicitReg-r17
                                                                                                       OPTIONAL
    ]]
RelayParameters-r17 ::= SEQUENCE {
    relayUE-Operation-L2-r17
                                                      ENUMERATED {supported}
                                                                                                               OPTIONAL,
                                                      ENUMERATED {supported}
    remoteUE-Operation-L2-r17
                                                                                                               OPTIONAL,
    remoteUE-PathSwitchToIdleInactiveRelay-r17
                                                   ENUMERATED {supported}
                                                                                                           OPTIONAL,
-- TAG-SIDELINKPARAMETERS-STOP
```

SidelinkParametersEUTRA field descriptions

si-ParametersEUTRA1, si-ParametersEUTRA2, si-ParametersEUTRA3

This field includes IE of *SL-Parameters-v1430* (where *v2x-eNB-Scheduled-r14* and *V2X-SupportedBandCombination-r14* shall not be included), *SL-Parameters-v1530* (where *V2X-SupportedBandCombination-r1530* shall not be included) and *SL-Parameters-v1540* respectively defined in 36.331 [10]. It is used for reporting the per-UE capability for V2X sidelink communication.

SimultaneousRxTxPerBandPair

-- ASN1STOP

The IE Simultaneous Rx/TxPerBandPair contains the simultaneous Rx/Tx UE capability for each band pair in a band combination.

SimultaneousRxTxPerBandPair information element

```
-- ASN1START
-- TAG-SIMULTANEOUSRXTXPERBANDPAIR-START

SimultaneousRxTxPerBandPair ::= BIT STRING (SIZE (3..496))

-- TAG-SIMULTANEOUSRXTXPERBANDPAIR-STOP
```

-- ASN1STOP

SON-Parameters

The IE SON-Parameters contains SON related parameters.

SON-Parameters information element

```
-- ASN1START
-- TAG-SON-PARAMETERS-START
SON-Parameters-r16 ::= SEQUENCE {
   rach-Report-r16
                         ENUMERATED {supported}
                                                 OPTIONAL,
   . . . ,
   ] ]
   rlfReportCHO-r17
                         ENUMERATED {supported}
                                                 OPTIONAL,
   rlfReportDAPS-r17
                         ENUMERATED {supported}
                                                 OPTIONAL,
   success-HO-Report-r17 ENUMERATED
                                   {supported}
                                                 OPTIONAL,
   twoStepRACH-Report-r17 ENUMERATED
                                   {supported}
                                                 OPTIONAL,
   pscell-MHI-Report-r17 ENUMERATED {supported}
                                                 OPTIONAL,
   OPTIONAL
   11
-- TAG-SON-PARAMETERS-STOP
-- ASN1STOP
```

SpatialRelationsSRS-Pos

The IE SpatialRelationsSRS-Pos is used to convey spatial relation for SRS for positioning related parameters.

SpatialRelationsSRS-Pos information element

```
-- ASN1START
-- TAG-SPATIALRELATIONSSRS-POS-START
SpatialRelationsSRS-Pos-r16 ::=
                                                    SEQUENCE {
    spatialRelation-SRS-PosBasedOnSSB-Serving-r16
                                                        ENUMERATED {supported}
                                                                                               OPTIONAL,
    spatialRelation-SRS-PosBasedOnCSI-RS-Serving-r16
                                                       ENUMERATED
                                                                   {supported}
                                                                                              OPTIONAL,
    spatialRelation-SRS-PosBasedOnPRS-Serving-r16
                                                       ENUMERATED
                                                                   {supported}
                                                                                              OPTIONAL,
    spatialRelation-SRS-PosBasedOnSRS-r16
                                                        ENUMERATED
                                                                   {supported}
                                                                                              OPTIONAL,
    spatialRelation-SRS-PosBasedOnSSB-Neigh-r16
                                                                   {supported}
                                                       ENUMERATED
                                                                                              OPTIONAL,
    spatialRelation-SRS-PosBasedOnPRS-Neigh-r16
                                                        ENUMERATED {supported}
                                                                                              OPTIONAL
--TAG-SPATIALRELATIONSSRS-POS-STOP
-- ASN1STOP
```

SRS-AllPosResourcesRRC-Inactive

The IE SRS-AllPosResourcesRRC-Inactive is used to convey SRS positioning related parameters specific for a certain band.

SRS-AllPosResourcesRRC-Inactive information element

```
-- ASN1START
-- TAG-SRS-ALLPOSRESOURCESRRC-INACTIVE-START
                                                              SEOUENCE {
SRS-AllPosResourcesRRC-Inactive-r17 ::=
     srs-PosResourcesRRC-Inactive-r17
                                                                  SEQUENCE
     -- R1 27-15: Positioning SRS transmission in RRC_INACTIVE state for initial UL BWP
         maxNumberSRS-PosResourceSetPerBWP-r17 ENUMERATED {n1, n2, n4, n8, n12, n16},
         maxNumberSRS-PosResourcesPerBWP-r17 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
maxNumberSRS-ResourcesPerBWP-PerSlot-r17 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14},
maxNumberPeriodicSRS-PosResourcesPerBWP-r17 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
                                                                       ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
         maxNumberPeriodicSRS-PosResourcesPerBWP-PerSlot-r17 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14},
         dummy1
                                                                       ENUMERATED {n1, n2, n4, n8, n16, n32, n64 },
         dummy2
                                                                       ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}
-- TAG-SRS-ALLPOSRESOURCESRRC-INACTIVE-STOP
-- ASN1STOP
```

SRS-AllPosResourcesRRC-Inactive field descriptions

dummy1, dummy2

The fields are not used in the specification and the network ignores the received values.

SRS-SwitchingTimeNR

The IE SRS-SwitchingTimeNR is used to indicate the SRS carrier switching time supported by the UE for one NR band pair.

SRS-SwitchingTimeNR information element

```
-- TAG-SRS-SWITCHINGTIMENR-STOP
-- ASN1STOP
```

SRS-SwitchingTimeEUTRA

The IE SRS-SwitchingTimeEUTRA is used to indicate the SRS carrier switching time supported by the UE for one E-UTRA band pair.

SRS-SwitchingTimeEUTRA information element

SupportedBandwidth

The IE SupportedBandwidth is used to indicate the channel bandwidth supported by the UE on one carrier of a band of a band combination.

SupportedBandwidth information element

UE-BasedPerfMeas-Parameters

The IE *UE-BasedPerfMeas-Parameters* contains UE-based performance measurement parameters.

UE-BasedPerfMeas-Parameters information element

```
-- ASN1START
-- TAG-UE-BASEDPERFMEAS-PARAMETERS-START
UE-BasedPerfMeas-Parameters-r16 ::= SEQUENCE {
    barometerMeasReport-r16 ENUMERATED {supported}
                                                                     OPTIONAL,
    immMeasBT-r16
                        ENUMERATED {supported}
                                                                     OPTIONAL,
   immMeasWLAN-r16ENUMERATED{supported}loggedMeasBT-r16ENUMERATED{supported}loggedMeasurements-r16ENUMERATED{supported}loggedMeasWLAN-r16ENUMERATED{supported}
                                                                     OPTIONAL,
                                                                     OPTIONAL,
                                                                     OPTIONAL,
                                                                     OPTIONAL,
    orientationMeasReport-r16 ENUMERATED {supported}
                                                                     OPTIONAL,
    speedMeasReport-r16
                                   ENUMERATED {supported}
                                                                     OPTIONAL,
    gnss-Location-r16
                                   ENUMERATED {supported}
                                                                     OPTIONAL,
    ulPDCP-Delay-r16
                                   ENUMERATED {supported}
                                                                     OPTIONAL,
    1 1
    sigBasedLogMDT-OverrideProtect-r17 ENUMERATED {supported}
                                                                     OPTIONAL,
    multipleCEF-Report-r17
                                          ENUMERATED {supported}
                                                                     OPTIONAL,
    excessPacketDelay-r17
                                          ENUMERATED {supported}
                                                                     OPTIONAL,
    earlyMeasLog-r17
                                          ENUMERATED {supported}
                                                                    OPTIONAL
    11
-- TAG-UE-BASEDPERFMEAS-PARAMETERS-STOP
-- ASN1STOP
```

UE-CapabilityRAT-ContainerList

The IE UE-CapabilityRAT-ContainerList contains a list of radio access technology specific capability containers.

UE-CapabilityRAT-ContainerList information element

```
-- ASN1START
-- TAG-UE-CAPABILITYRAT-CONTAINERLIST-START

UE-CapabilityRAT-ContainerList ::= SEQUENCE (SIZE (0..maxRAT-CapabilityContainers)) OF UE-CapabilityRAT-Container

UE-CapabilityRAT-Container ::= SEQUENCE {
    rat-Type RAT-Type,
    ue-CapabilityRAT-Container OCTET STRING
}

-- TAG-UE-CAPABILITYRAT-CONTAINERLIST-STOP
-- ASN1STOP
```

UE-CapabilityRAT-ContainerList field descriptions

ue-CapabilityRAT-Container

Container for the UE capabilities of the indicated RAT. The encoding is defined in the specification of each RAT:

For rat-Type set to nr. the encoding of UE capabilities is defined in UE-NR-Capability.

For rat-Type set to eutra-nr. the encoding of UE capabilities is defined in UE-MRDC-Capability.

For rat-Type set to eutra: the encoding of UE capabilities is defined in UE-EUTRA-Capability specified in TS 36.331 [10].

For rat-Type set to utra-fdd: the octet string contains the INTER RAT HANDOVER INFO message defined in TS 25.331 [45].

UE-CapabilityRAT-RequestList

The IE UE-CapabilityRAT-RequestList is used to request UE capabilities for one or more RATs from the UE.

UE-CapabilityRAT-RequestList information element

```
-- ASN1START
-- TAG-UE-CAPABILITYRAT-REQUESTLIST-START

UE-CapabilityRAT-RequestList ::= SEQUENCE (SIZE (1..maxRAT-CapabilityContainers)) OF UE-CapabilityRAT-Request

UE-CapabilityRAT-Request ::= SEQUENCE {
    rat-Type RAT-Type,
    capabilityRequestFilter OCTET STRING OPTIONAL, -- Need N
    ...
}

-- TAG-UE-CAPABILITYRAT-REQUESTLIST-STOP
-- ASN1STOP
```

UE-CapabilityRAT-Request field descriptions

capabilityRequestFilter

Information by which the network requests the UE to filter the UE capabilities.

For rat-Type set to nr or eutra-nr. the encoding of the capabilityRequestFilter is defined in UE-CapabilityRequestFilterNR.

For rat-Type set to eutra: the encoding of the capabilityRequestFilter is defined by UECapabilityEnquiry message defined in TS36.331 [10], in which RAT-Type in UE-CapabilityRequest includes only 'eutra'.

rat-Tvpe

The RAT type for which the NW requests UE capabilities.

UE-CapabilityRequestFilterCommon

The IE UE-CapabilityRequestFilterCommon is used to request filtered UE capabilities. The filter is common for all capability containers that are requested.

UE-CapabilityRequestFilterCommon information element

```
-- ASN1START
-- TAG-UE-CAPABILITYREOUESTFILTERCOMMON-START
UE-CapabilityRequestFilterCommon ::=
                                                SEOUENCE
    mrdc-Request
                                                SEQUENCE {
       omitEN-DC
                                                    ENUMERATED {true}
                                                                                           OPTIONAL,
                                                                                                        -- Need N
       includeNR-DC
                                                    ENUMERATED {true}
                                                                                           OPTIONAL.
                                                                                                        -- Need N
        includeNE-DC
                                                    ENUMERATED {true}
                                                                                           OPTIONAL
                                                                                                        -- Need N
                                                                                       OPTIONAL,
                                                                                                        -- Need N
    ] ]
    codebookTypeRequest-r16
                                  SEOUENCE {
        type1-SinglePanel-r16
                                      ENUMERATED {true}
                                                                                            OPTIONAL,
                                                                                                         -- Need N
       type1-MultiPanel-r16
                                                                                                         -- Need N
                                      ENUMERATED {true}
                                                                                            OPTIONAL,
       type2-r16
                                       ENUMERATED {true}
                                                                                            OPTIONAL,
                                                                                                         -- Need N
       type2-PortSelection-r16
                                                                                                         -- Need N
                                      ENUMERATED {true}
                                                                                            OPTIONAL
                                                                                        OPTIONAL,
                                                                                                    -- Need N
    uplinkTxSwitchRequest-r16
                                   ENUMERATED {true}
                                                                                        OPTIONAL
                                                                                                    -- Need N
    ]],
    requestedCellGrouping-r16
                                   SEQUENCE (SIZE (1..maxCellGroupings-r16)) OF CellGrouping-r16
                                                                                                    OPTIONAL
                                                                                                               -- Cond NRDC
    ]],
    ] ]
    fallbackGroupFiveRequest-r17
                                  ENUMERATED {true}
                                                                                        OPTIONAL
                                                                                                     -- Need N
    ]]
CellGrouping-r16 ::=
                       SEQUENCE {
   mcg-r16
                            SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR,
    scg-r16
                           SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR,
                           ENUMERATED {sync, async}
    mode-r16
-- TAG-UE-CAPABILITYREQUESTFILTERCOMMON-STOP
-- ASN1STOP
```

UE-CapabilityRequestFilterCommon field descriptions

codebookTypeRequest

Only if this field is present, the UE includes SupportedCSI-RS-Resource supported for the codebook type(s) requested within this field (i.e. type I single/multi-panel, type II and type II port selection) into codebookVariantsList, codebookParametersPerBand and codebookParametersPerBC. If this field is present and none of the codebook types is requested within this field (i.e. empty field), the UE includes SupportedCSI-RS-Resource supported for all codebook types into codebookVariantsList, codebookParametersPerBand and codebookParametersPerBC.

fallbackGroupFiveRequest

Only if this field is present, the UE supporting FR2 CA bandwidth class from fallback group 5 shall include band combinations with FR2 CA bandwidth class from fallback group 5, and shall omit band combinations with FR2 CA bandwidth class from fallback group 2 or 3 (see TS 38.101-2 [39]) with same or lower capabilities.

includeNE-DC

Only if this field is present, the UE supporting NE-DC shall indicate support for NE-DC in band combinations and include feature set combinations which are applicable to NE-DC. Band combinations supporting both NE-DC and (NG)EN-DC shall be included in *supportedBandCombinationList*, band combinations supporting only NE-DC shall be included in *supportedBandCombinationListNEDC-Only*.

includeNR-DC

Only if this field is present, the UE supporting NR-DC shall indicate support for NR-DC in band combinations and include feature set combinations which are applicable to NR-DC.

mode

The mode of NR-DC operation that the NW is interested in for this cell grouping. The value *sync* means that the UE only indicates NR-DC support for band combinations for which it supports synchronous NR-DC with the requested cell grouping. The value *async* means that the UE only indicates NR-DC support for band combinations for which it supports asynchronous NR-DC with the requested cell grouping.

omitEN-DC

Only if this field is present, the UE shall omit band combinations and feature set combinations which are only applicable to (NG)EN-DC.

requestedCellGrouping

The NR-DC cell groupings that the NW is interested in, i.e., the bands that it might use in an MCG and the bands that it might use in an SCG. Only if this field is present, the UE indicates NR-DC support for band combinations for which it supports the requested cell grouping, i.e., in which it supports at least one of the *mcg* bands on MCG and at least one of the *scg* bands on the SCG. In its *supportedBandCombinationList*, the UE indicates which of its NR-DC band combinations supports which of the requested cell groupings. The first element in this list is referred to by ID#0, the second by ID#1 and so on. If this field is absent, the UE only includes band combinations for which it supports NR-DC with only FR1 bands in MCG and only FR2 bands in SCG.

Example 1: requestedCellGrouping is set to mcg=[n1, n7, n41, n66] and scg=[n78, n261]. This assumes that the NW would always use CA among n1, n7, n41 and n66 (depending on which are deployed on a given site) whereas with n78 and/or n261 the NW may need to use DC. With this filter a UE may report a band combination n1A-n7A-n78A for NR-DC only if it supports that serving cells for n1 and n7 are in the MCG and a serving cell for n78 is in the SCG. The UE may also report a band combination n41C-n261M for NR-DC provided that it supports a serving cell for n41 in the MCG and a serving cell for n261 in the SCG.

Example 2: One requestedCellGrouping is set to mcg=[n1, n7, n41, n66] and scg=[n78, n261] and another requestedCellGrouping is set to mcg=[n1, n7, n66] and scg=[n41, n78, n261]. This assumes that the NW uses sometimes CA among n1, n7, n41 and n66 (as in example 1) and sometimes CA among n1, n7 and n66 but DC towards one or several of n41, n78, n261. If a UE supports n1A-n41A-n78A only if n41A and n78A are in the same cell group, this UE may only indicate cell grouping ID#1 (not #0) in its BC.

uplinkTxSwitchRequest

Only if this field is present, the UE supporting dynamic UL Tx switching shall indicate support for UL Tx switching in band combinations which are applicable to inter-band UL CA, SUL and (NG)EN-DC.

Conditional Presence	Explanation
NRDC	The field is optionally present, Need N, if <i>includeNR-DC</i> is included. It is absent otherwise.

UE-CapabilityRequestFilterNR

The IE *UE-CapabilityRequestFilterNR* is used to request filtered UE capabilities.

UE-CapabilityRequestFilterNR information element

```
-- ASN1START
-- TAG-UE-CAPABILITYREOUESTFILTERNR-START
UE-CapabilityRequestFilterNR ::=
                                            SEOUENCE {
    frequencyBandListFilter
                                                FreqBandList
                                                                                       OPTIONAL.
                                                                                                   -- Need N
                                                UE-CapabilityRequestFilterNR-v1540
    nonCriticalExtension
                                                                                       OPTIONAL
UE-CapabilityRequestFilterNR-v1540 ::=
                                            SEOUENCE {
    srs-SwitchingTimeRequest
                                                ENUMERATED {true}
                                                                                       OPTIONAL, -- Need N
    nonCriticalExtension
                                                UE-CapabilityRequestFilterNR-v1710
                                                                                       OPTIONAL
UE-CapabilityRequestFilterNR-v1710 ::=
                                            SEOUENCE {
    sidelinkRequest-r17
                                                ENUMERATED {true}
                                                                                       OPTIONAL, -- Need N
    nonCriticalExtension
                                                SEOUENCE {}
                                                                                       OPTIONAL
-- TAG-UE-CAPABILITYREQUESTFILTERNR-STOP
-- ASN1STOP
```

UE-MRDC-Capability

The IE UE-MRDC-Capability is used to convey the UE Radio Access Capability Parameters for MR-DC, see TS 38.306 [26].

UE-MRDC-Capability information element

```
-- ASN1START
-- TAG-UE-MRDC-CAPABILITY-START
UE-MRDC-Capability ::=
                                    SEQUENCE
    measAndMobParametersMRDC
                                        MeasAndMobParametersMRDC
                                                                                                                          OPTIONAL,
    phy-ParametersMRDC-v1530
                                        Phy-ParametersMRDC
                                                                                                                          OPTIONAL,
    rf-ParametersMRDC
                                        RF-ParametersMRDC,
    generalParametersMRDC
                                        GeneralParametersMRDC-XDD-Diff
                                                                                                                          OPTIONAL.
    fdd-Add-UE-MRDC-Capabilities
                                        UE-MRDC-CapabilityAddXDD-Mode
                                                                                                                          OPTIONAL,
    tdd-Add-UE-MRDC-Capabilities
                                        UE-MRDC-CapabilityAddXDD-Mode
                                                                                                                          OPTIONAL,
    fr1-Add-UE-MRDC-Capabilities
                                        UE-MRDC-CapabilityAddFRX-Mode
                                                                                                                          OPTIONAL,
    fr2-Add-UE-MRDC-Capabilities
                                        UE-MRDC-CapabilityAddFRX-Mode
                                                                                                                          OPTIONAL,
    featureSetCombinations
                                        SEQUENCE (SIZE (1..maxFeatureSetCombinations)) OF FeatureSetCombination
                                                                                                                          OPTIONAL,
    pdcp-ParametersMRDC-v1530
                                        PDCP-ParametersMRDC
                                                                                                                          OPTIONAL,
    lateNonCriticalExtension
                                        OCTET STRING (CONTAINING UE-MRDC-Capability-v15g0)
                                                                                                                          OPTIONAL,
    nonCriticalExtension
                                        UE-MRDC-Capability-v1560
                                                                                                                          OPTIONAL
```

```
-- Regular non-critical extensions:
UE-MRDC-Capability-v1560 ::=
                                    SEQUENCE {
    receivedFilters
                                        OCTET STRING (CONTAINING UECapabilityEnquiry-v1560-IEs)
                                                                                                                          OPTIONAL,
    measAndMobParametersMRDC-v1560
                                        MeasAndMobParametersMRDC-v1560
                                                                                                                          OPTIONAL.
    fdd-Add-UE-MRDC-Capabilities-v1560
                                        UE-MRDC-CapabilityAddXDD-Mode-v1560
                                                                                                                          OPTIONAL,
    tdd-Add-UE-MRDC-Capabilities-v1560
                                        UE-MRDC-CapabilityAddXDD-Mode-v1560
                                                                                                                          OPTIONAL,
    nonCriticalExtension
                                        UE-MRDC-Capability-v1610
                                                                                                                          OPTIONAL
UE-MRDC-Capability-v1610 ::=
                                    SEQUENCE {
    measAndMobParametersMRDC-v1610
                                        MeasAndMobParametersMRDC-v1610
                                                                                                                          OPTIONAL,
                                                                                                                          OPTIONAL,
    generalParametersMRDC-v1610
                                        GeneralParametersMRDC-v1610
    pdcp-ParametersMRDC-v1610
                                        PDCP-ParametersMRDC-v1610
                                                                                                                          OPTIONAL.
    nonCriticalExtension
                                        UE-MRDC-Capability-v1700
                                                                                                                          OPTIONAL
                                    SEQUENCE {
UE-MRDC-Capability-v1700 ::=
    measAndMobParametersMRDC-v1700
                                        MeasAndMobParametersMRDC-v1700,
    nonCriticalExtension
                                        UE-MRDC-Capability-v1730
                                                                                                                          OPTIONAL
UE-MRDC-Capability-v1730 ::=
                                     SEQUENCE {
    measAndMobParametersMRDC-v1730
                                        MeasAndMobParametersMRDC-v1730
                                                                                                                          OPTIONAL.
    nonCriticalExtension
                                        SEOUENCE {}
                                                                                                                          OPTIONAL
-- Late non-critical extensions:
                                    SEOUENCE {
UE-MRDC-Capability-v15q0 ::=
    rf-ParametersMRDC-v15q0
                                        RF-ParametersMRDC-v15q0
                                                                                                                          OPTIONAL,
    nonCriticalExtension
                                        SEQUENCE {}
                                                                                                                          OPTIONAL
UE-MRDC-CapabilityAddXDD-Mode ::= SEQUENCE {
    measAndMobParametersMRDC-XDD-Diff
                                             MeasAndMobParametersMRDC-XDD-Diff
                                                                                                                          OPTIONAL.
                                            GeneralParametersMRDC-XDD-Diff
    generalParametersMRDC-XDD-Diff
                                                                                                                          OPTIONAL
UE-MRDC-CapabilityAddXDD-Mode-v1560 ::=
    measAndMobParametersMRDC-XDD-Diff-v1560
                                               MeasAndMobParametersMRDC-XDD-Diff-v1560
                                                                                                                          OPTIONAL
UE-MRDC-CapabilityAddFRX-Mode ::= SEQUENCE
    measAndMobParametersMRDC-FRX-Diff
                                             MeasAndMobParametersMRDC-FRX-Diff
GeneralParametersMRDC-XDD-Diff ::= SEQUENCE {
    splitSRB-WithOneUL-Path
                                         ENUMERATED {supported}
                                                                                                                          OPTIONAL.
    splitDRB-withUL-Both-MCG-SCG
                                        ENUMERATED
                                                    {supported}
                                                                                                                          OPTIONAL,
    srb3
                                        ENUMERATED
                                                    {supported}
                                                                                                                          OPTIONAL,
    dummy
                                        ENUMERATED
                                                   {supported}
                                                                                                                          OPTIONAL,
```

UE-MRDC-Capability field descriptions

featureSetCombinations

A list of FeatureSetCombination:s for supportedBandCombinationList and supportedBandCombinationListNEDC-Only in UE-MRDC-Capability. The FeatureSetDownlink:s and FeatureSetUplink:s referred to from these FeatureSetCombination:s are defined in the featureSets list in UE-NR-Capability.

UE-NR-Capability

The IE UE-NR-Capability is used to convey the NR UE Radio Access Capability Parameters, see TS 38.306 [26].

UE-NR-Capability information element

```
-- ASN1START
-- TAG-UE-NR-CAPABILITY-START
UE-NR-Capability ::=
                                SEQUENCE {
    accessStratumRelease
                                    AccessStratumRelease
    pdcp-Parameters
                                    PDCP-Parameters,
    rlc-Parameters
                                    RLC-Parameters
                                                                                                            OPTIONAL,
    mac-Parameters
                                    MAC-Parameters
                                                                                                            OPTIONAL,
    phy-Parameters
                                    Phy-Parameters,
    rf-Parameters
                                    RF-Parameters,
    measAndMobParameters
                                    MeasAndMobParameters
                                                                                                            OPTIONAL,
    fdd-Add-UE-NR-Capabilities
                                    UE-NR-CapabilityAddXDD-Mode
                                                                                                            OPTIONAL,
    tdd-Add-UE-NR-Capabilities
                                    UE-NR-CapabilityAddXDD-Mode
                                                                                                            OPTIONAL,
    fr1-Add-UE-NR-Capabilities
                                     UE-NR-CapabilityAddFRX-Mode
                                                                                                            OPTIONAL,
    fr2-Add-UE-NR-Capabilities
                                    UE-NR-CapabilityAddFRX-Mode
                                                                                                            OPTIONAL,
    featureSets
                                     FeatureSets
                                                                                                            OPTIONAL,
                                     SEQUENCE (SIZE (1..maxFeatureSetCombinations)) OF FeatureSetCombination
    featureSetCombinations
                                                                                                                       OPTIONAL,
    lateNonCriticalExtension
                                    OCTET STRING (CONTAINING UE-NR-Capability-v15c0)
                                                                                                            OPTIONAL,
    nonCriticalExtension
                                    UE-NR-Capability-v1530
                                                                                                            OPTIONAL
-- Regular non-critical Rel-15 extensions:
UE-NR-Capability-v1530 ::=
                                          SEOUENCE {
    fdd-Add-UE-NR-Capabilities-v1530
                                              UE-NR-CapabilityAddXDD-Mode-v1530
                                                                                                            OPTIONAL,
    tdd-Add-UE-NR-Capabilities-v1530
                                              UE-NR-CapabilityAddXDD-Mode-v1530
                                                                                                            OPTIONAL,
                                              ENUMERATED {supported}
    dummy
                                                                                                            OPTIONAL,
                                              InterRAT-Parameters
    interRAT-Parameters
                                                                                                            OPTIONAL,
                                              ENUMERATED {supported}
    inactiveState
                                                                                                            OPTIONAL,
    delayBudgetReporting
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL,
    nonCriticalExtension
                                              UE-NR-Capability-v1540
                                                                                                            OPTIONAL
```

```
UE-NR-Capability-v1540 ::=
                                        SEQUENCE {
    sdap-Parameters
                                            SDAP-Parameters
                                                                                                            OPTIONAL,
    overheatingInd
                                            ENUMERATED {supported}
                                                                                                            OPTIONAL,
    ims-Parameters
                                            IMS-Parameters
                                                                                                            OPTIONAL,
    fr1-Add-UE-NR-Capabilities-v1540
                                            UE-NR-CapabilityAddFRX-Mode-v1540
                                                                                                            OPTIONAL,
    fr2-Add-UE-NR-Capabilities-v1540
                                            UE-NR-CapabilityAddFRX-Mode-v1540
                                                                                                            OPTIONAL,
    fr1-fr2-Add-UE-NR-Capabilities
                                            UE-NR-CapabilityAddFRX-Mode
                                                                                                            OPTIONAL,
    nonCriticalExtension
                                            UE-NR-Capability-v1550
                                                                                                            OPTIONAL
UE-NR-Capability-v1550 ::=
                                         SEOUENCE {
    reducedCP-Latency
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL,
    nonCriticalExtension
                                              UE-NR-Capability-v1560
                                                                                                            OPTIONAL
UE-NR-Capability-v1560 ::=
                                         SEOUENCE {
    nrdc-Parameters
                                            NRDC-Parameters
                                                                                                            OPTIONAL,
    receivedFilters
                                            OCTET STRING (CONTAINING UECapabilityEnquiry-v1560-IEs)
                                                                                                            OPTIONAL,
    nonCriticalExtension
                                            UE-NR-Capability-v1570
                                                                                                            OPTIONAL
UE-NR-Capability-v1570 ::=
                                         SEOUENCE {
    nrdc-Parameters-v1570
                                            NRDC-Parameters-v1570
                                                                                                            OPTIONAL,
    nonCriticalExtension
                                            UE-NR-Capability-v1610
                                                                                                            OPTIONAL
-- Late non-critical Rel-15 extensions:
UE-NR-Capability-v15c0 ::=
                                         SEOUENCE {
    nrdc-Parameters-v15c0
                                              NRDC-Parameters-v15c0
                                                                                                            OPTIONAL,
    partialFR2-FallbackRX-Req
                                              ENUMERATED {true}
                                                                                                            OPTIONAL,
    nonCriticalExtension
                                              UE-NR-Capability-v15g0
                                                                                                            OPTIONAL
UE-NR-Capability-v15g0 ::=
                                         SEOUENCE {
    rf-Parameters-v15q0
                                              RF-Parameters-v15g0
                                                                                                            OPTIONAL,
    nonCriticalExtension
                                              UE-NR-Capability-v15j0
                                                                                                            OPTIONAL
UE-NR-Capability-v15j0 ::=
                                         SEOUENCE {
    -- Following field is only for REL-15 late non-critical extensions
    lateNonCriticalExtension
                                              OCTET STRING
                                                                                                            OPTIONAL,
    nonCriticalExtension
                                              UE-NR-Capability-v16a0
                                                                                                            OPTIONAL
-- Regular non-critical Rel-16 extensions:
UE-NR-Capability-v1610 ::=
                                         SEQUENCE {
    inDeviceCoexInd-r16
                                            ENUMERATED {supported}
                                                                                                            OPTIONAL,
                                            ENUMERATED {supported}
    dl-DedicatedMessageSegmentation-r16
                                                                                                            OPTIONAL,
    nrdc-Parameters-v1610
                                            NRDC-Parameters-v1610
                                                                                                            OPTIONAL,
    powSav-Parameters-r16
                                            PowSav-Parameters-r16
                                                                                                            OPTIONAL,
    fr1-Add-UE-NR-Capabilities-v1610
                                            UE-NR-CapabilityAddFRX-Mode-v1610
                                                                                                            OPTIONAL,
                                            UE-NR-CapabilityAddFRX-Mode-v1610
    fr2-Add-UE-NR-Capabilities-v1610
                                                                                                            OPTIONAL,
```

```
bh-RLF-Indication-r16
                                             ENUMERATED {supported}
                                                                                                            OPTIONAL,
    directSN-AdditionFirstRRC-IAB-r16
                                             ENUMERATED {supported}
                                                                                                            OPTIONAL.
    bap-Parameters-r16
                                             BAP-Parameters-r16
                                                                                                            OPTIONAL.
    referenceTimeProvision-r16
                                             ENUMERATED {supported}
                                                                                                            OPTIONAL.
    sidelinkParameters-r16
                                             SidelinkParameters-r16
                                                                                                            OPTIONAL.
    highSpeedParameters-r16
                                             HighSpeedParameters-r16
                                                                                                            OPTIONAL,
    mac-Parameters-v1610
                                             MAC-Parameters-v1610
                                                                                                            OPTIONAL,
                                             ENUMERATED {supported}
    mcgRLF-RecoveryViaSCG-r16
                                                                                                            OPTIONAL,
    resumeWithStoredMCG-SCells-r16
                                             ENUMERATED {supported}
                                                                                                            OPTIONAL,
    resumeWithStoredSCG-r16
                                             ENUMERATED {supported}
                                                                                                            OPTIONAL,
    resumeWithSCG-Config-r16
                                             ENUMERATED {supported}
                                                                                                            OPTIONAL,
    ue-BasedPerfMeas-Parameters-r16
                                             UE-BasedPerfMeas-Parameters-r16
                                                                                                            OPTIONAL,
    son-Parameters-r16
                                             SON-Parameters-r16
                                                                                                            OPTIONAL,
    onDemandSIB-Connected-r16
                                             ENUMERATED {supported}
                                                                                                            OPTIONAL.
    nonCriticalExtension
                                             UE-NR-Capability-v1640
                                                                                                            OPTIONAL
UE-NR-Capability-v1640 ::=
                                          SEOUENCE {
                                             ENUMERATED {supported}
    redirectAtResumeByNAS-r16
                                                                                                            OPTIONAL,
    phy-ParametersSharedSpectrumChAccess-r16 Phy-ParametersSharedSpectrumChAccess-r16
                                                                                                            OPTIONAL,
    nonCriticalExtension
                                             UE-NR-Capability-v1650
                                                                                                            OPTIONAL
UE-NR-Capability-v1650 ::=
                                          SEOUENCE {
    mpsPriorityIndication-r16
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL,
    highSpeedParameters-v1650
                                              HighSpeedParameters-v1650
                                                                                                             OPTIONAL,
    nonCriticalExtension
                                              UE-NR-Capability-v1690
                                                                                                            OPTIONAL
UE-NR-Capability-v1690 ::=
                                          SEOUENCE {
                                              ENUMERATED {supported}
    ul-RRC-Segmentation-r16
                                                                                                            OPTIONAL,
    nonCriticalExtension
                                              UE-NR-Capability-v1700
                                                                                                            OPTIONAL
-- Late non-critical extensions from Rel-16 onwards:
UE-NR-Capability-v16a0 ::=
                                          SEOUENCE {
    phy-Parameters-v16a0
                                              Phy-Parameters-v16a0
                                                                                                            OPTIONAL,
    rf-Parameters-v16a0
                                              RF-Parameters-v16a0
                                                                                                             OPTIONAL,
    nonCriticalExtension
                                              SEOUENCE {}
                                                                                                            OPTIONAL
-- Regular non-critical Rel-17 extensions:
UE-NR-Capability-v1700 ::=
                                          SEOUENCE {
    inactiveStatePO-Determination-r17
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL,
    highSpeedParameters-v1700
                                              HighSpeedParameters-v1700
                                                                                                            OPTIONAL.
                                              PowSav-Parameters-v1700
    powSav-Parameters-v1700
                                                                                                            OPTIONAL.
    mac-Parameters-v1700
                                              MAC-Parameters-v1700
                                                                                                            OPTIONAL.
    ims-Parameters-v1700
                                              IMS-Parameters-v1700
                                                                                                            OPTIONAL,
    measAndMobParameters-v1700
                                              MeasAndMobParameters-v1700,
    appLayerMeasParameters-r17
                                              AppLayerMeasParameters-r17
                                                                                                            OPTIONAL,
                                              RedCapParameters-r17
    redCapParameters-r17
                                                                                                            OPTIONAL,
    ra-SDT-r17
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL,
    srb-SDT-r17
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL,
    qNB-SideRTT-BasedPDC-r17
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL,
```

```
bh-RLF-DetectionRecovery-Indication-r17 ENUMERATED {supported}
                                                                                                            OPTIONAL,
    nrdc-Parameters-v1700
                                              NRDC-Parameters-v1700
                                                                                                            OPTIONAL,
    bap-Parameters-v1700
                                              BAP-Parameters-v1700
                                                                                                            OPTIONAL.
    musim-GapPreference-r17
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL,
    musimLeaveConnected-r17
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL,
    mbs-Parameters-r17
                                              MBS-Parameters-r17,
    nonTerrestrialNetwork-r17
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL,
                                              ENUMERATED { gso, ngso}
    ntn-ScenarioSupport-r17
                                                                                                            OPTIONAL,
    sliceInfoforCellReselection-r17
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL,
    ue-RadioPagingInfo-r17
                                              UE-RadioPagingInfo-r17
                                                                                                            OPTIONAL,
    -- R4 17-2 UL gap pattern for Tx power management
                                              BIT STRING (SIZE (4))
    ul-GapFR2-Pattern-r17
                                                                                                            OPTIONAL,
    ntn-Parameters-r17
                                              NTN-Parameters-r17
                                                                                                            OPTIONAL,
    nonCriticalExtension
                                              SEOUENCE {}
                                                                                                            OPTIONAL
UE-NR-CapabilityAddXDD-Mode ::=
                                         SEOUENCE {
    phy-ParametersXDD-Diff
                                             Phy-ParametersXDD-Diff
                                                                                                            OPTIONAL,
    mac-ParametersXDD-Diff
                                             MAC-ParametersXDD-Diff
                                                                                                            OPTIONAL,
                                             MeasAndMobParametersXDD-Diff
    measAndMobParametersXDD-Diff
                                                                                                            OPTIONAL
UE-NR-CapabilityAddXDD-Mode-v1530 ::=
                                          SEOUENCE {
    eutra-ParametersXDD-Diff
                                              EUTRA-ParametersXDD-Diff
UE-NR-CapabilityAddFRX-Mode ::= SEQUENCE {
    phy-ParametersFRX-Diff
                                         Phy-ParametersFRX-Diff
                                                                                                            OPTIONAL,
    measAndMobParametersFRX-Diff
                                         MeasAndMobParametersFRX-Diff
                                                                                                             OPTIONAL
UE-NR-CapabilityAddFRX-Mode-v1540 ::=
                                          SEQUENCE {
    ims-ParametersFRX-Diff
                                              IMS-ParametersFRX-Diff
                                                                                                            OPTIONAL
UE-NR-CapabilityAddFRX-Mode-v1610 ::=
                                          SEOUENCE {
    powSav-ParametersFRX-Diff-r16
                                              PowSav-ParametersFRX-Diff-r16
                                                                                                            OPTIONAL,
    mac-ParametersFRX-Diff-r16
                                              MAC-ParametersFRX-Diff-r16
                                                                                                            OPTIONAL
BAP-Parameters-r16 ::=
                                          SEOUENCE {
    flowControlBH-RLC-ChannelBased-r16
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL,
    flowControlRouting-ID-Based-r16
                                              ENUMERATED {supported}
                                                                                                             OPTIONAL
BAP-Parameters-v1700 ::=
                                          SEOUENCE {
    bapHeaderRewriting-Rerouting-r17
                                              ENUMERATED {supported}
                                                                                                            OPTIONAL.
                                              ENUMERATED {supported}
    bapHeaderRewriting-Routing-r17
                                                                                                             OPTIONAL
MBS-Parameters-r17 ::=
                                          SEOUENCE {
    maxMRB-Add-r17
                                              INTEGER (1..16)
                                                                                                            OPTIONAL
```

```
-- TAG-UE-NR-CAPABILITY-STOP
-- ASN1STOP
```

UE-NR-Capability field descriptions

featureSetCombinations

A list of FeatureSetCombination:s for supportedBandCombinationList in UE-NR-Capability. The FeatureSetDownlink:s and FeatureSetUplink:s referred to from these FeatureSetCombination:s are defined in the featureSets list in UE-NR-Capability.

UE-NR-Capability-v1540 field descriptions

fr1-fr2-Add-UE-NR-Capabilities

This instance of *UE-NR-CapabilityAddFRX-Mode* does not include any other fields than *csi-RS-IM-ReceptionForFeedback/ csi-RS-ProcFrameworkForSRS/ csi-ReportFramework*.

UE-RadioPagingInfo

The IE *UE-RadioPagingInfo* contains UE capability information needed for paging.

UE-RadioPagingInfo information element

```
-- ASN1START
-- TAG-UE-RADIOPAGINGINFO-START

UE-RadioPagingInfo-r17 ::= SEQUENCE {
    -- R1 29-1: Paging enhancement
    pei-SubgroupingSupportBandList-r17 SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR OPTIONAL,
    ...
}

-- TAG-UE-RADIOPAGINGINFO-STOP
-- ASN1STOP
```

SharedSpectrumChAccessParamsPerBand

The IE SharedSpectrumChAccessParamsPerBand is used to convey shared channel access related parameters specific for a certain frequency band (not per feature set or band combination).

SharedSpectrumChAccessParamsPerBand information element

```
-- ASN1START
-- TAG-SHAREDSPECTRUMCHACCESSPARAMSPERBAND-START

SharedSpectrumChAccessParamsPerBand-r16 ::= SEQUENCE {
```

```
-- R1 10-1: UL channel access for dynamic channel access mode
ul-DynamicChAccess-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-1a: UL channel access for semi-static channel access mode
ul-Semi-StaticChAccess-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-2: SSB-based RRM for dynamic channel access mode
ssb-RRM-DynamicChAccess-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-2a: SSB-based RRM for semi-static channel access mode
ssb-RRM-Semi-StaticChAccess-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL.
-- R1 10-2b: MIB reading on unlicensed cell
mib-Acquisition-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-2c: SSB-based RLM for dynamic channel access mode
ssb-RLM-DynamicChAccess-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-2d: SSB-based RLM for semi-static channel access mode
ssb-RLM-Semi-StaticChAccess-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-2e: SIB1 reception on unlicensed cell
sib1-Acquisition-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-2f: Support monitoring of extended RAR window
extRA-ResponseWindow-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-2q: SSB-based BFD/CBD for dynamic channel access mode
ssb-BFD-CBD-dynamicChannelAccess-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-2h: SSB-based BFD/CBD for semi-static channel access mode
                                                     ENUMERATED {supported}
ssb-BFD-CBD-semi-staticChannelAccess-r16
                                                                                        OPTIONAL,
-- R1 10-2i: CSI-RS-based BFD/CBD for NR-U
csi-RS-BFD-CBD-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL.
-- R1 10-7: UL channel access for 10 MHz SCell
ul-ChannelBW-SCell-10mhz-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-10: RSSI and channel occupancy measurement and reporting
rssi-ChannelOccupancyReporting-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-11:SRS starting position at any OFDM symbol in a slot
                                                     ENUMERATED {supported}
srs-StartAnyOFDM-Symbol-r16
                                                                                        OPTIONAL,
-- R1 10-20: Support search space set configuration with fregMonitorLocation-r16
searchSpaceFreqMonitorLocation-r16
                                                     INTEGER (1..5)
                                                                                        OPTIONAL,
-- R1 10-20a: Support coreset configuration with rb-Offset
coreset-RB-Offset-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-23:CGI reading on unlicensed cell for ANR functionality
cgi-Acquisition-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL.
-- R1 10-25: Enable configured UL transmissions when DCI 2_0 is configured but not detected
                                                      ENUMERATED {supported}
configuredUL-Tx-r16
                                                                                         OPTIONAL,
-- R1 10-27: Wideband PRACH
prach-Wideband-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-29: Support available RB set indicator field in DCI 2_0
                                                     ENUMERATED {supported}
dci-AvailableRB-Set-r16
                                                                                        OPTIONAL,
-- R1 10-30: Support channel occupancy duration indicator field in DCI 2_0
dci-ChOccupancyDuration-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-8: Type B PDSCH length {3, 5, 6, 8, 9, 10, 11, 12, 13} without DMRS shift due to CRS collision
typeB-PDSCH-length-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-9: Search space set group switching with explicit DCI 2_0 bit field trigger or with implicit PDCCH decoding with DCI 2_0 monitoring
searchSpaceSwitchWithDCI-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-9b: Search space set group switching with implicit PDCCH decoding without DCI 2_0 monitoring
                                                     ENUMERATED {supported}
searchSpaceSwitchWithoutDCI-r16
                                                                                        OPTIONAL,
-- R1 10-9d: Support Search space set group switching capability 2
searchSpaceSwitchCapability2-r16
                                                     ENUMERATED {supported}
                                                                                        OPTIONAL,
-- R1 10-14: Non-numerical PDSCH to HARQ-ACK timing
                                                     ENUMERATED {supported}
non-numericalPDSCH-HARQ-timing-r16
                                                                                        OPTIONAL,
```

```
-- R1 10-15: Enhanced dynamic HARO codebook
    enhancedDynamicHARO-codebook-r16
                                                         ENUMERATED {supported}
                                                                                            OPTIONAL,
    -- R1 10-16: One-shot HARO ACK feedback
    oneShotHARO-feedback-r16
                                                         ENUMERATED {supported}
                                                                                            OPTIONAL,
    -- R1 10-17: Multi-PUSCH UL grant
                                                         ENUMERATED {supported}
    multiPUSCH-UL-grant-r16
                                                                                            OPTIONAL,
    -- R1 10-26: CSI-RS based RLM for NR-U
    csi-RS-RLM-r16
                                                         ENUMERATED {supported}
                                                                                            OPTIONAL.
    dummy
                                                        ENUMERATED {supported}
                                                                                          OPTIONAL,
                                                        CSI-RS-ValidationWith-DCI-r16 configured
    -- R1 10-31: Support of P/SP-CSI-RS reception with
    periodicAndSemi-PersistentCSI-RS-r16
                                                         ENUMERATED {supported}
                                                                                            OPTIONAL,
    -- R1 10-3: PRB interlace mapping for PUSCH
                                                         ENUMERATED {supported}
    pusch-PRB-interlace-r16
                                                                                            OPTIONAL.
    -- R1 10-3a: PRB interlace mapping for PUCCH
    pucch-F0-F1-PRB-Interlace-r16
                                                         ENUMERATED {supported}
                                                                                            OPTIONAL,
    -- R1 10-12: OCC for PRB interlace mapping for PF2 and PF3
                                                         ENUMERATED {supported}
    occ-PRB-PF2-PF3-r16
                                                                                            OPTIONAL,
    -- R1 10-13a: Extended CP range of more than one symbol for CG-PUSCH
                                                         ENUMERATED {supported}
    extCP-rangeCG-PUSCH-r16
                                                                                            OPTIONAL,
    -- R1 10-18: Configured grant with retransmission in CG resources
    configuredGrantWithReTx-r16
                                                         ENUMERATED {supported}
                                                                                            OPTIONAL.
    -- R1 10-21a: Support using ED threshold given by qNB for UL to DL COT sharing
                                                         ENUMERATED {supported}
    ed-Threshold-r16
                                                                                            OPTIONAL,
    -- R1 10-21b: Support UL to DL COT sharing
    ul-DL-COT-Sharing-r16
                                                         ENUMERATED {supported}
                                                                                            OPTIONAL,
    -- R1 10-24: CG-UCI multiplexing with HARQ ACK
    mux-CG-UCI-HARQ-ACK-r16
                                                         ENUMERATED {supported}
                                                                                            OPTIONAL,
    -- R1 10-28: Configured grant with Rel-16 enhanced resource configuration
                                                         ENUMERATED {supported}
    cq-resourceConfiq-r16
                                                                                            OPTIONAL
SharedSpectrumChAccessParamsPerBand-v1630 ::=
                                                     SEOUENCE {
    -- R4 4-1: DL reception in intra-carrier guardband
    dl-ReceptionIntraCellGuardband-r16
                                                         ENUMERATED {supported}
                                                                                            OPTIONAL,
    -- R4 4-2: DL reception when qNB does not transmit on all RB sets of a carrier as a result of LBT
    dl-ReceptionLBT-subsetRB-r16
                                                         ENUMERATED {supported}
                                                                                            OPTIONAL
SharedSpectrumChAccessParamsPerBand-v1640 ::=
                                                     SEOUENCE {
    -- 10-26b(1-4): CSI-RS based RRM measurement with associated SS-block
                                                          ENUMERATED {supported}
    csi-RSRP-AndRSRO-MeasWithSSB-r16
                                                                                               OPTIONAL,
    -- 10-26c(1-5): CSI-RS based RRM measurement without associated SS-block
                                                         ENUMERATED {supported}
    csi-RSRP-AndRSRQ-MeasWithoutSSB-r16
                                                                                               OPTIONAL,
    -- 10-26d(1-6): CSI-RS based RS-SINR measurement
    csi-SINR-Meas-r16
                                                            ENUMERATED {supported}
                                                                                                  OPTIONAL.
    -- 10-26e(1-8): RLM based on a mix of SS block and CSI-RS signals within active BWP
    ssb-AndCSI-RS-RLM-r16
                                                           ENUMERATED {supported}
                                                                                                 OPTIONAL,
    -- 10-26f(1-9): CSI-RS based contention free RA for HO
    csi-RS-CFRA-ForHO-r16
                                                           ENUMERATED {supported}
                                                                                                 OPTIONAL
SharedSpectrumChAccessParamsPerBand-v1650 ::=
                                                     SEOUENCE {
    -- Extension of R1 10-9 capability to configure up to 16 instead of 4 cells or cell groups, respectively
    extendedSearchSpaceSwitchWithDCI-r16
                                                         ENUMERATED {supported}
                                                                                               OPTIONAL
```

6.3.4 Other information elements

AbsoluteTimeInfo

The IE AbsoluteTimeInfo indicates an absolute time in a format YY-MM-DD HH:MM:SS and using BCD encoding. The first/ leftmost bit of the bit string contains the most significant bit of the most significant digit of the year and so on.

AbsoluteTimeInfo information element

```
-- ASN1START
-- TAG-ABSOLUTETIMEINFO-START

AbsoluteTimeInfo-r16 ::= BIT STRING (SIZE (48))
-- TAG-ABSOLUTETIMEINFO-STOP
-- ASN1STOP
```

AppLayerMeasConfig

The IE AppLayerMeasConfig indicates configuration of application layer measurements.

AppLayerMeasConfig information element

```
measConfigAppLayerId-r17
                                        MeasConfigAppLayerId-r17,
   measConfigAppLayerContainer-r17
                                        OCTET STRING (SIZE (1..8000))
                                                                                                                  OPTIONAL, -- Need N
                                        ENUMERATED {streaming, mtsi, vr, spare5, spare4, spare3, spare2, spare1}
    serviceTvpe-r17
                                                                                                                  OPTIONAL. -- Need M
    pauseReporting-r17
                                        BOOLEAN
                                                                                                                  OPTIONAL, -- Need M
    transmissionOfSessionStartStop-r17
                                                                                                                  OPTIONAL. -- Need M
    ran-VisibleParameters-r17
                                        SetupRelease {RAN-VisibleParameters-r17}
                                                                                                                  OPTIONAL, -- Cond ServiceType
RAN-VisibleParameters-r17 ::=
    ran-VisiblePeriodicity-r17 ENUMERATED {ms120, ms240, ms480, ms640, ms1024}
                                                                                                                  OPTIONAL, -- Need S
   numberOfBufferLevelEntries-r17 INTEGER (1..8)
                                                                                                                  OPTIONAL, -- Need R
    reportPlayoutDelayForMediaStartup-r17 BOOLEAN
                                                                                                                  OPTIONAL, -- Need M
-- TAG-APPLAYERMEASCONFIG-STOP
-- ASN1STOP
```

AppLayerMeasConfig field descriptions

measConfigAppLayerContainer

The field contains configuration of application layer measurements, see Annex L (normative) in TS 26.247 [68], clause 16.5 in TS 26.114 [69] and TS 26.118 [70].

pauseReporting

The field indicates whether the transmission of measReportAppLayerContainer is paused or not. Value true indicates the transmission of measReportAppLayerContainer is paused; value false indicates the transmission of measReportAppLayerContainer is not paused.

ran-VisibleParameters

The field indicates whether RAN visible application layer measurements shall be reported or not.

rrc-SeaAllowed

This field indicates that RRC segmentation of *MeasurementReportAppLayer* is allowed. It may be present only if the UE supports RRC segmentation of the *MeasurementReportAppLayer* message in UL.

serviceType

Indicates the type of application layer measurement. Value *streaming* indicates Quality of Experience Measurement Collection for streaming services (see TS 26.247 [68]), value *mtsi* indicates Quality of Experience Measurement Collection for MTSI (see TS 26.114 [69]). value *vr* indicates Quality of Experience Measurement Collection for VR service (see TS 26.118 [70]). The network always configures *serviceType* when application layer measurements are initially configured and at *fullConfig*.

transmissionOfSessionStartStop

The field indicates whether the UE shall transmit indications when sessions in the application layer start and stop. The UE transmits a session start indication upon configuration of this field if a session already has started in the application layer.

RAN-VisibleParameters field descriptions

numberOfBufferLevelEntries

The field contains the maximum number of buffer level entries that can be reported for RAN visible application layer measurements. This field is also used by application layer to calculate the interval of RAN visible buffer level measurement, which is equal to the periodicity of RAN visible application layer measurements reporting divided by numberOfBufferLevelEntries.

ran-VisiblePeriodicity

The field indicates the periodicity of RAN visible application layer measurements reporting. Value ms120 indicates 120 ms, value ms240 indicates 240 ms and so on.

reportPlayoutDelayForMediaStartup

The field indicates whether the UE shall report Playout Delay for Media Startup for RAN visible application layer measurements.

Conditional Presence	Explanation
ServiceType	This field is optionally present, Need M, when serviceType is set to streaming or vr. Otherwise, it is absent.

AreaConfiguration

The *AreaConfiguration* indicates area for which UE is requested to perform measurement logging. If not configured, measurement logging is not restricted to specific cells or tracking areas but applies as long as the RPLMN is contained in *plmn-IdentityList* stored in *VarLogMeasReport*.

AreaConfiguration information element

```
-- ASN1START
-- TAG-AREACONFIGURATION-START
AreaConfiguration-r16 ::=
                               SEQUENCE {
   areaConfig-r16
                                   AreaConfig-r16,
    interFreqTargetList-r16
                                   SEQUENCE(SIZE (1..maxFreq)) OF InterFreqTargetInfo-r16
                                                                                                     OPTIONAL -- Need R
AreaConfiguration-v1700 ::=
                               SEQUENCE {
    areaConfig-r17
                                   AreaConfig-r16
                                                                                                     OPTIONAL, -- Need R
    interFreqTargetList-r17
                                   SEQUENCE(SIZE (1..maxFreq)) OF InterFreqTargetInfo-r16
                                                                                                     OPTIONAL -- Need R
AreaConfig-r16 ::= CHOICE {
                                   CellGlobalIdList-r16,
    cellGlobalIdList-r16
   trackingAreaCodeList-r16
                                   TrackingAreaCodeList-r16,
    trackingAreaIdentityList-r16
                                   TrackingAreaIdentityList-r16
InterFreqTargetInfo-r16 ::= SEQUENCE {
   dl-CarrierFreq-r16
                                   ARFCN-ValueNR,
    cellList-r16
                                   SEQUENCE (SIZE (1..32)) OF PhysCellId OPTIONAL
                                                                                       -- Need R
CellGlobalIdList-r16 ::=
                               SEQUENCE (SIZE (1..32)) OF CGI-Info-Logging-r16
```

AreaConfiguration field descriptions

InterFreqTargetInfo

If configured, it indicates the neighbouring frequency and cells for which UE is requested to perform measurement logging. It can include sync raster or non-sync raster frequencies.

BT-NameList

The IE BT-NameList is used to indicate the names of the Bluetooth beacon which the UE is configured to measure.

BT-NameList information element

```
-- ASN1START
-- TAG-BTNAMELIST-START

BT-NameList-r16 ::= SEQUENCE (SIZE (1..maxBT-Name-r16)) OF BT-Name-r16

BT-Name-r16 ::= OCTET STRING (SIZE (1..248))

-- TAG-BTNAMELIST-STOP
-- ASN1STOP
```

BT-NameList field descriptions

bt-Name

If configured, the UE only performs Bluetooth measurements according to the names identified. For each name, it refers to LOCAL NAME defined in Bluetooth specification [51].

DedicatedInfoF1c

The IE *DedicatedInfoF1c* is used to transfer IAB-DU specific F1-C related information between the network and the IAB node. The carried information consists of F1AP message encapsulated in SCTP/IP or F1-C related (SCTP)/IP packet, see TS 38.472 [64]. The RRC layer is transparent for this information.

DedicatedInfoF1c information element

```
-- ASN1START
-- TAG-DEDICATEDINFOF1C-START

DedicatedInfoF1c-r17 ::= OCTET STRING
-- TAG-DEDICATEDINFOF1C-STOP
-- ASN1STOP
```

EUTRA-AllowedMeasBandwidth

The IE *EUTRA-AllowedMeasBandwidth* is used to indicate the maximum allowed measurement bandwidth on a carrier frequency as defined by the parameter Transmission Bandwidth Configuration "N_{RB}" in TS 36.104 [33]. The values *mbw6*, *mbw15*, *mbw25*, *mbw50*, *mbw75*, *mbw100* indicate 6, 15, 25, 50, 75 and 100 resource blocks, respectively.

EUTRA-AllowedMeasBandwidth information element

```
-- ASN1START
-- TAG-EUTRA-ALLOWEDMEASBANDWIDTH-START

EUTRA-AllowedMeasBandwidth ::= ENUMERATED {mbw6, mbw15, mbw25, mbw50, mbw75, mbw100}

-- TAG-EUTRA-ALLOWEDMEASBANDWIDTH-STOP
-- ASN1STOP
```

EUTRA-MBSFN-SubframeConfigList

The IE EUTRA-MBSFN-SubframeConfigList is used to define an E-UTRA MBSFN subframe pattern (for the purpose of NR rate matching).

EUTRA-MBSFN-SubframeConfigList information element

```
-- ASN1START
-- TAG-EUTRA-MBSFN-SUBFRAMECONFIGLIST-START
EUTRA-MBSFN-SubframeConfigList ::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF EUTRA-MBSFN-SubframeConfig
EUTRA-MBSFN-SubframeConfig ::=
                                  SEQUENCE {
                               ENUMERATED {n1, n2, n4, n8, n16, n32},
   radioframeAllocationPeriod
   radioframeAllocationOffset
                                     INTEGER (0..7),
   subframeAllocation1
                                      CHOICE {
       oneFrame
                                         BIT STRING (SIZE(6)),
       fourFrames
                                         BIT STRING (SIZE(24))
   subframeAllocation2
                                      CHOICE {
       oneFrame
                                          BIT STRING (SIZE(2)),
       fourFrames
                                          BIT STRING (SIZE(8))
```

OPTIONAL, -- Need R

```
}
-- TAG-EUTRA-MBSFN-SUBFRAMECONFIGLIST-STOP
-- ASN1STOP
```

EUTRA-MBSFN-SubframeConfig field descriptions

radioframeAllocationOffset

Field as defined in MBSFN-SubframeConfig in TS 36.331 [10].

radioframeAllocationPeriod

Field as defined in MBSFN-SubframeConfig in TS 36.331 [10], where SFN refers to the SFN of the NR serving cell.

subframeAllocation1

Field as defined in MBSFN-SubframeConfig in TS 36.331 [10], where the UE assumes the duplex mode (FDD or TDD) of the NR cell for which the E-UTRA-MBSFN-SubframeConfig is provided.

subframeAllocation2

Field as defined in MBSFN-SubframeConfig-v1430 in TS 36.331 [10], where the UE assumes the duplex mode (FDD or TDD) of the NR cell for which the E-UTRA-MBSFN-SubframeConfig is provided.

EUTRA-MultiBandInfoList

The IE *EUTRA-MultiBandInfoList* indicates the list of frequency bands in addition to the band represented by *CarrierFreq* for which cell reselection parameters are common, and a list of *additionalPmax* and *additionalSpectrumEmission*.

EUTRA-MultiBandInfoList information element

```
-- ASN1START
-- TAG-EUTRA-MULTIBANDINFOLIST-START

EUTRA-MultiBandInfoList ::= SEQUENCE (SIZE (1..maxMultiBands)) OF EUTRA-MultiBandInfo

EUTRA-MultiBandInfo ::= SEQUENCE {
    eutra-FreqBandIndicator FreqBandIndicatorEUTRA,
    eutra-NS-PmaxList EUTRA-NS-PmaxList OPTIONAL -- Need R
}

-- TAG-EUTRA-MULTIBANDINFOLIST-STOP
-- ASN1STOP
```

EUTRA-NS-PmaxList

The IE EUTRA-NS-PmaxList concerns a list of additionalPmax and additionalSpectrumEmission, as defined in TS 36.101 [22], table 6.2.4-1 for UEs neither in CE nor BL UEs and TS 36.101 [22], table 6.2.4E-1 for UEs in CE or BL UEs, for a given frequency band.

EUTRA-NS-PmaxList information element

```
-- ASN1START
-- TAG-EUTRA-NS-PMAXLIST-START

EUTRA-NS-PmaxList ::= SEQUENCE (SIZE (1..maxEUTRA-NS-Pmax)) OF EUTRA-NS-PmaxValue

EUTRA-NS-PmaxValue ::= SEQUENCE {
   additionalPmax INTEGER (-30..33) OPTIONAL, -- Need R
   additionalSpectrumEmission INTEGER (1..288) OPTIONAL -- Need R
}

-- TAG-EUTRA-NS-PMAXLIST-STOP
-- ASN1STOP
```

- EUTRA-PhysCellId

-- TAG-EUTRA-PHYSCELLIDRANGE-STOP

The IE EUTRA-PhysCellId is used to indicate the physical layer identity of the cell, as defined in TS 36.211 [31].

EUTRA-PhysCellId information element

```
-- ASN1START
-- TAG-EUTRA-PHYSCELLID-START

EUTRA-PhysCellid ::= INTEGER (0..503)

-- TAG-EUTRA-PHYSCELLID-STOP
-- ASN1STOP
```

EUTRA-PhysCellIdRange

The IE *EUTRA-PhysCellIdRange* is used to encode either a single or a range of physical cell identities. The range is encoded by using a *start* value and by indicating the number of consecutive physical cell identities (including *start*) in the range. For fields comprising multiple occurrences of *EUTRA-PhysCellIdRange*, NW may configure overlapping ranges of physical cell identities.

EUTRA-PhysCellIdRange information element

-- ASN1STOP

– EUTRA-PresenceAntennaPort1

The IE *EUTRA-PresenceAntennaPort1* is used to indicate whether all the neighbouring cells use Antenna Port 1. When set to *true*, the UE may assume that at least two cell-specific antenna ports are used in all neighbouring cells.

EUTRA-PresenceAntennaPort1 information element

```
-- ASN1START
-- TAG-EUTRA-PRESENCEANTENNAPORT1-START

EUTRA-PresenceAntennaPort1 ::= BOOLEAN
-- TAG-EUTRA-PRESENCEANTENNAPORT1-STOP
-- ASN1STOP
```

EUTRA-Q-OffsetRange

The IE *EUTRA-Q-OffsetRange* is used to indicate a cell, or frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value in dB. Value *dB-24* corresponds to -24 dB, value *dB-22* corresponds to -22 dB and so on.

EUTRA-Q-OffsetRange information element

IAB-IP-Address

The IE *IAB-IP-Address* is used to indicate the IP address/prefix.

IAB-IP-Address information element

-- ASN1START

IAB-IP-Address field descriptions

iPv4-Address

This field is used to provide the allocated IPv4 address.

iPv6-Address

This field is used to provide the allocated IPv6 address.

iPv6-Prefix

This field is used to provide the allocated IPv6 prefix.

IAB-IP-AddressIndex

The IE IAB-IP-AddressIndex is used to identify a configuration of an IP address.

IAB-IP-AddressIndex information element

```
-- ASN1START
-- TAG-IABIPADDRESSINDEX-START

IAB-IP-AddressIndex-r16 ::= INTEGER (1..maxIAB-IP-Address-r16)
-- TAG-IABIPADDRESSINDEX-STOP
-- ASN1STOP
```

- IAB-IP-Usage

The IE IAB-IP-Usage is used to indicate the usage of the assigned IP address/prefix.

IAB-IP-Usage information element

```
-- ASN1START
-- TAG-IAB-IP-USAGE-START

IAB-IP-Usage-r16 ::= ENUMERATED {f1-C, f1-U, non-F1, spare}
```

```
-- TAG-IAB-IP-USAGE-STOP
-- ASN1STOP
```

- LoggingDuration

The *LoggingDuration* indicates the duration for which UE is requested to perform measurement logging. Value min10 corresponds to 10 minutes, value min20 corresponds to 20 minutes and so on.

LoggingDuration information element

- LoggingInterval

The *LoggingInterval* indicates the periodicity for logging measurement results. Value ms1280 corresponds to 1.28s, value ms2560 corresponds to 2.56s and so on. Value infinity means it is equal to the configured value of the *LoggingDuration* IE.

LoggingInterval information element

LogMeasResultListBT

The IE *LogMeasResultListBT* covers measured results for Bluetooth.

LogMeasResultListBT information element

```
-- ASN1START
-- TAG-LOGMEASRESULTLISTBT-START
```

LogMeasResultListBT field descriptions

bt-Addr

This field indicates the Bluetooth public address of the Bluetooth beacon as defined in TS 37.355 [49].

rssi-BT

This field provides the beacon received signal strength indicator (RSSI) in dBm as defined in TS 37.355 [49].

LogMeasResultListWLAN

The IE *LogMeasResultListWLAN* covers measured results for WLAN.

LogMeasResultListWLAN information element

```
-- ASN1START
-- TAG-LOGMEASRESULTLISTWLAN-START
                                SEQUENCE (SIZE (1..maxWLAN-Id-Report-r16)) OF LogMeasResultWLAN-r16
LogMeasResultListWLAN-r16 ::=
LogMeasResultWLAN-r16 ::=
                                 SEQUENCE {
    wlan-Identifiers-r16
                                    WLAN-Identifiers-r16,
    rssiWLAN-r16
                                    WLAN-RSSI-Range-r16
                                                                  OPTIONAL,
                                    WLAN-RTT-r16
                                                                  OPTIONAL,
   rtt-WLAN-r16
WLAN-Identifiers-r16 ::=
                                SEQUENCE {
    ssid-r16
                                    OCTET STRING (SIZE (1..32)) OPTIONAL,
   bssid-r16
                                    OCTET STRING (SIZE (6))
                                                                  OPTIONAL,
   hessid-r16
                                    OCTET STRING (SIZE (6))
                                                                  OPTIONAL,
WLAN-RSSI-Range-r16 ::= INTEGER(0..141)
WLAN-RTT-r16 ::=
   rttValue-r16
                                     INTEGER (0..16777215),
   rttUnits-r16
                                     ENUMERATED {
                                         microseconds,
```

```
hundredsofnanoseconds,
tensofnanoseconds,
nanoseconds,
nanoseconds,
tenthsofnanoseconds,
...},
rttAccuracy-r16 INTEGER (0..255) OPTIONAL,
...
}

-- TAG-LOGMEASRESULTLISTWLAN-STOP
-- ASN1STOP
```

LogMeasResultListWLAN field descriptions

Bssid

Basic Service Set Identifier (BSSID) defined in IEEE 802.11-2012 [50].

Hessid

Homogenous Extended Service Set Identifier (HESSID) defined in IEEE 802.11-2012 [50].

rssiWLAN

Measured WLAN RSSI result in dBm. The IE WLAN-RSSI-Range specifies the value range used in WLAN RSSI measurements and thresholds. Integer value for WLAN RSSI measurements is according to mapping table in TS 36.133 [40]. Value 0 corresponds to –infinity, value 1 to -100dBm, value 2 to -99dBm, and so on (i.e. in steps of 1dBm) until value 140, which corresponds to 39dBm, while value 141 corresponds to +infinity.

rtt-WLAN

This field provides the measured roundtrip time between the target device and WLAN AP and optionally the accuracy expressed as the standard deviation of the delay. Units for each of these are 1000ns, 10ns, 10ns, 10ns, and 0.1ns as defined in TS 37.355 [49].

rttValue

This field specifies the Round Trip Time (RTT) measurement between the target device and WLAN AP in units given by the field rttUnits as defined in TS 37.355 [49].

rttUnits

This field specifies the Units for the fields rttValue and rttAccuracy. The available Units are 1000ns, 100ns, 10ns, 1ns, and 0.1ns as defined in TS 37.355 [49].

rttAccuracy

This field provides the estimated accuracy of the provided rttValue expressed as the standard deviation in units given by the field rttUnits as defined in TS 37.355 [49].

Ssid

Service Set Identifier (SSID) defined in IEEE 802.11-2012 [50].

Wlan-Identifiers

Indicates the WLAN parameters used for identification of the WLAN for which the measurement results are applicable.

MeasConfigAppLayerId

The IE MeasConfigAppLayerId identifies the application layer measurement.

MeasConfigAppLayerId information element

```
-- ASN1START
-- TAG-MEASCONFIGAPPLAYERID-START

MeasConfigAppLayerId-r17 ::= INTEGER (0..maxNrofAppLayerMeas-1-r17)
```

```
-- TAG-MEASCONFIGAPPLAYERID-STOP
-- ASN1STOP
```

- OtherConfig

The IE OtherConfig contains configuration related to miscellaneous other configurations.

OtherConfig information element

```
-- ASN1START
-- TAG-OTHERCONFIG-START
OtherConfig ::=
                               SEQUENCE {
    delayBudgetReportingConfig CHOICE{
       release
                               NULL,
                               SEQUENCE {
       setup
           delayBudgetReportingProhibitTimer
                                               ENUMERATED {s0, s0dot4, s0dot8, s1dot6, s3, s6, s12, s30}
                                                                                                                        -- Need M
                                                                                                        OPTIONAL
OtherConfig-v1540 ::=
                               SEOUENCE {
    overheatingAssistanceConfig
                                   SetupRelease {OverheatingAssistanceConfig}
                                                                                                        OPTIONAL, -- Need M
CandidateServingFreqListNR-r16 ::= SEQUENCE (SIZE (1..maxFreqIDC-r16)) OF ARFCN-ValueNR
OtherConfig-v1610 ::=
                                       SEOUENCE {
    idc-AssistanceConfig-r16
                                           SetupRelease {IDC-AssistanceConfig-r16}
                                                                                                        OPTIONAL, -- Need M
    drx-PreferenceConfig-r16
                                           SetupRelease {DRX-PreferenceConfig-r16}
                                                                                                        OPTIONAL, -- Need M
    maxBW-PreferenceConfig-r16
                                           SetupRelease {MaxBW-PreferenceConfig-r16}
                                                                                                        OPTIONAL, -- Need M
    maxCC-PreferenceConfig-r16
                                           SetupRelease {MaxCC-PreferenceConfig-r16}
                                                                                                        OPTIONAL, -- Need M
    maxMIMO-LayerPreferenceConfig-r16
                                           SetupRelease {MaxMIMO-LayerPreferenceConfig-r16}
                                                                                                        OPTIONAL, -- Need M
    minSchedulingOffsetPreferenceConfig-r16 SetupRelease (MinSchedulingOffsetPreferenceConfig-r16)
                                                                                                        OPTIONAL, -- Need M
                                                                                                        OPTIONAL, -- Need M
    releasePreferenceConfig-r16
                                           SetupRelease {ReleasePreferenceConfig-r16}
    referenceTimePreferenceReporting-r16
                                           ENUMERATED {true}
                                                                                                        OPTIONAL, -- Need R
                                           SetupRelease {BT-NameList-r16}
    btNameList-r16
                                                                                                        OPTIONAL, -- Need M
    wlanNameList-r16
                                           SetupRelease {WLAN-NameList-r16}
                                                                                                        OPTIONAL, -- Need M
    sensorNameList-r16
                                           SetupRelease {Sensor-NameList-r16}
                                                                                                        OPTIONAL, -- Need M
    obtainCommonLocation-r16
                                           ENUMERATED {true}
                                                                                                        OPTIONAL, -- Need R
                                           ENUMERATED{true}
                                                                                                        OPTIONAL -- Need R
    sl-AssistanceConfigNR-r16
OtherConfig-v1700 ::=
                                       SEOUENCE {
    ul-GapFR2-PreferenceConfig-r17
                                           ENUMERATED {true}
                                                                                                        OPTIONAL, -- Need R
    musim-GapAssistanceConfig-r17
                                           SetupRelease {MUSIM-GapAssistanceConfig-r17}
                                                                                                        OPTIONAL, -- Need M
    musim-LeaveAssistanceConfig-r17
                                           SetupRelease {MUSIM-LeaveAssistanceConfig-r17}
                                                                                                        OPTIONAL, -- Need M
    successHO-Config-r17
                                           SetupRelease {SuccessHO-Config-r17}
                                                                                                        OPTIONAL, -- Need M
    maxBW-PreferenceConfigFR2-2-r17
                                           ENUMERATED {true}
                                                                                                        OPTIONAL, -- Cond maxBW
    maxMIMO-LayerPreferenceConfigFR2-2-r17 ENUMERATED {true}
                                                                                                        OPTIONAL, -- Cond maxMIMO
    OPTIONAL, -- Cond minOffset
```

```
rlm-RelaxationReportingConfig-r17
                                            SetupRelease {RLM-RelaxationReportingConfig-r17}
                                                                                                           OPTIONAL, -- Need M
    bfd-RelaxationReportingConfig-r17
                                            SetupRelease {BFD-RelaxationReportingConfig-r17}
                                                                                                           OPTIONAL, -- Need M
    scg-DeactivationPreferenceConfig-r17
                                            SetupRelease
                                                         {SCG-DeactivationPreferenceConfig-r17}
                                                                                                           OPTIONAL, -- Cond SCG
    rrm-MeasRelaxationReportingConfig-r17
                                            SetupRelease {RRM-MeasRelaxationReportingConfig-r17}
                                                                                                           OPTIONAL, -- Need M
    propDelayDiffReportConfig-r17
                                            SetupRelease {PropDelayDiffReportConfig-r17}
                                                                                                           OPTIONAL -- Need M
MUSIM-GapAssistanceConfig-r17 ::= SEOUENCE {
    musim-GapProhibitTimer-r17
                                      ENUMERATED {s0, s0dot1, s0dot2, s0dot3, s0dot4, s0dot5, s1, s2, s3, s4, s5, s6, s7, s8, s9, s10}
MUSIM-LeaveAssistanceConfig-r17 ::=
                                        SEQUENCE {
    musim-LeaveWithoutResponseTimer-r17
                                            ENUMERATED {ms10, ms20, ms40, ms60, ms80, ms100, spare2, spare1}
SuccessHO-Config-r17 ::=
                                        SEOUENCE {
    thresholdPercentageT304-r17
                                            ENUMERATED {p40, p60, p80, spare5, spare4, spare3, spare2, spare1}
                                                                                                                     OPTIONAL, --Need R
    thresholdPercentageT310-r17
                                            ENUMERATED {p40, p60, p80, spare5, spare4, spare3, spare2, spare1}
                                                                                                                     OPTIONAL, --Need R
    thresholdPercentageT312-r17
                                            ENUMERATED {p20, p40, p60, p80, spare4, spare3, spare2, spare1}
                                                                                                                     OPTIONAL, -- Need R
    sourceDAPS-FailureReporting-r17
                                            ENUMERATED {true}
                                                                                                                     OPTIONAL, --Need R
OverheatingAssistanceConfig ::= SEOUENCE {
    overheatingIndicationProhibitTimer
                                          ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30,
                                          s60, s90, s120, s300, s600, spare3, spare2, spare1}
IDC-AssistanceConfig-r16 ::=
                                SEOUENCE {
    candidateServingFreqListNR-r16 CandidateServingFreqListNR-r16
                                                                                        OPTIONAL, -- Need R
    . . .
DRX-PreferenceConfig-r16 ::=
                                      SEQUENCE {
    drx-PreferenceProhibitTimer-r16
                                          ENUMERATED
                                              s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
                                              s8, s9, s10, s20, s30, spare2, spare1}
MaxBW-PreferenceConfig-r16 ::=
                                      SEOUENCE {
    maxBW-PreferenceProhibitTimer-r16
                                          ENUMERATED {
                                              s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
                                              s8, s9, s10, s20, s30, spare2, spare1}
MaxCC-PreferenceConfig-r16 ::=
                                      SEOUENCE {
   maxCC-PreferenceProhibitTimer-r16
                                          ENUMERATED
                                              s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
                                              s8, s9, s10, s20, s30, spare2, spare1}
MaxMIMO-LayerPreferenceConfig-r16 ::= SEOUENCE
    maxMIMO-LayerPreferenceProhibitTimer-r16 ENUMERATED
                                                 s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
```

```
s8, s9, s10, s20, s30, spare2, spare1}
MinSchedulingOffsetPreferenceConfig-r16 ::= SEOUENCE {
    minSchedulingOffsetPreferenceProhibitTimer-r16 ENUMERATED {
                                                       s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
                                                      s8, s9, s10, s20, s30, spare2, spare1}
ReleasePreferenceConfig-r16 ::=
                                     SEQUENCE {
    releasePreferenceProhibitTimer-r16
                                         ENUMERATED
                                             s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
                                             s8, s9, s10, s20, s30, infinity, spare1},
    connectedReporting
                                         ENUMERATED {true}
                                                                                                          OPTIONAL -- Need R
RLM-RelaxationReportingConfig-r17 ::= SEQUENCE {
    rlm-RelaxtionReportingProhibitTimer ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30,
                                         s60, s90, s120, s300, s600, infinity, spare2, spare1}
BFD-RelaxationReportingConfig-r17 ::= SEQUENCE {
    bfd-RelaxtionReportingProhibitTimer ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30,
                                         s60, s90, s120, s300, s600, infinity, spare2, spare1}
SCG-DeactivationPreferenceConfig-r17 ::=
                                              SEOUENCE {
    scq-DeactivationPreferenceProhibitTimer-r17
                                                  ENUMERATED {
                                                  s0, s1, s2, s4, s8, s10, s15, s30,
                                                  s60, s120, s180, s240, s300, s600, s900, s1800}
RRM-MeasRelaxationReportingConfig-r17 ::= SEQUENCE {
    s-SearchDeltaP-Stationary-r17
                                             ENUMERATED {dB2, dB3, dB6, dB9, dB12, dB15, spare2, spare1},
                                             ENUMERATED {s5, s10, s20, s30, s60, s120, s180, s240, s300, spare7, spare6, spare5,
    t-SearchDeltaP-Stationary-r17
                                                         spare4, spare3, spare2, spare1}
PropDelayDiffReportConfig-r17 ::= SEQUENCE {
    threshPropDelayDiff-r17
                                      ENUMERATED {ms0dot5, ms1, ms2, ms3, ms4, ms5, ms6, ms7, ms8, ms9, ms10, spare5,
                                                          spare4, spare3, spare2, spare1}
                                                                                                        OPTIONAL, -- Need M
                                                                                                                     -- Need M
                                     SEQUENCE (SIZE (1..maxCellNTN-r17)) OF NeighbourCellInfo-r17
    neighCellInfoList-r17
                                                                                                          OPTIONAL
NeighbourCellInfo-r17 ::= SEOUENCE {
epochTime-r17
                              EpochTime-r17,
ephemerisInfo-r17
                              EphemerisInfo-r17
-- TAG-OTHERCONFIG-STOP
-- ASN1STOP
```

OtherConfig field descriptions

bfd-RelaxationReportingConfig

Configuration for the UE to report the relaxation state of BFD measurements.

candidateServingFreqListNR

Indicates for each candidate NR serving cells, the center frequency around which UE is requested to report IDC issues.

connectedReporting

Indicates that the UE can report a preference to remain in RRC_CONNECTED state following a report to leave RRC_CONNECTED state. If absent, the UE cannot report a preference to stay in RRC_CONNECTED state.

delayBudgetReportingProhibitTimer

Prohibit timer for delay budget reporting. Value in seconds. Value s0 means prohibit timer is set to 0 seconds, value s0dot4 means prohibit timer is set to 0.4 seconds, and so on.

drx-PreferenceConfig

Configuration for the UE to report assistance information to inform the gNB about the UE's DRX preferences for power saving.

drx-PreferenceProhibitTimer

Prohibit timer for DRX preferences assistance information reporting. Value in seconds. Value s0 means prohibit timer is set to 0 seconds, value s0 means prohibit timer is set to 0 seconds, value s1 means prohibit timer is set to 1 second and so on.

idc-AssistanceConfig

Configuration for the UE to report assistance information to inform the gNB about UE detected IDC problem.

maxBW-PreferenceConfig

Configuration for the UE to report assistance information to inform the gNB about the UE's preferred bandwidth for power saving.

maxBW-PreferenceProhibitTimer

Prohibit timer for preferred bandwidth assistance information reporting. Value in seconds. Value s0 means prohibit timer is set to 0 seconds, value s0 means prohibit timer is set to 0 seconds, value s1 means prohibit timer is set to 1 second and so on.

maxCC-PreferenceConfig

Configuration for the UE to report assistance information to inform the gNB about the UE's preferred number of carriers for power saving.

maxBW-PreferenceConfigFR2-2

Configuration for the UE to report assistance information to inform the gNB about the UE's preferred bandwidth for power saving for FR2-2.

maxCC-PreferenceProhibitTimer

Prohibit timer for preferred number of carriers assistance information reporting. Value in seconds. Value s0 means prohibit timer is set to 0 seconds, value s0 means prohibit timer is set to 0.5 seconds, value s1 means prohibit timer is set to 1 second and so on.

maxMIMO-LayerPreferenceConfig

Configuration for the UE to report assistance information to inform the qNB about the UE's preferred number of MIMO layers for power saving.

maxMIMO-LayerPreferenceConfigFR2-2

Configuration for the UE to report assistance information to inform the gNB about the UE's preferred number of MIMO layers for power saving for FR2-2.

maxMIMO-LayerPreferenceProhibitTimer

Prohibit timer for preferred number of number of MIMO layers assistance information reporting. Value in seconds. Value s0 means prohibit timer is set to 0 seconds, value s0 means prohibit timer is set to 0.5 seconds, value s1 means prohibit timer is set to 1 second and so on.

minSchedulingOffsetPreferenceConfig

Configuration for the UE to report assistance information to inform the gNB about the UE's preferred minimumSchedulingOffset value for cross-slot scheduling for power saving.

${\it min Scheduling Off set Preference Config Ext}$

Configuration for the UE to report assistance information to inform the gNB about the UE's preferred *minimumSchedulingOffset* value for cross-slot scheduling for power saving for SCS 480 kHz and/or 960 kHz.

minSchedulingOffsetPreferenceProhibitTimer

Prohibit timer for preferred *minimumSchedulingOffset* assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on.

musim-GapAssistanceConfig

Configuration for the UE to report assistance information for gap preference.

musim-GapProhibitTimer

Prohibit timer for MUSIM assistance information reporting for gap preference.

musim-LeaveAssistanceConfig

Configuration for the UE to report assistance information for leaving RRC_CONNECTED for MUSIM purpose.

musim-LeaveWithoutResponseTimer

Indicates the timer for the UE to enter RRC IDLE for MUSIM purpose as defined in clause 5.3.8.6.

obtainCommonLocation

Requests the UE to attempt to have detailed location information available using GNSS. NR configures the field if *includeCommonLocationInfo* is configured for one or more measurements.

overheatingAssistanceConfig

Configuration for the UE to report assistance information to inform the gNB about UE detected internal overheating.

overheatingIndicationProhibitTimer

Prohibit timer for overheating assistance information reporting. Value in seconds. Value s0 means prohibit timer is set to 0 seconds, value s0dot5 means prohibit timer is set to 0.5 seconds, value s1 means prohibit timer is set to 1 second and so on.

propDelayDiffReportConfig

Configuration for the UE to report service link propagation delay difference between serving cell and neighbour cell(s).

referenceTimePreferenceReporting

If present, the field indicates the UE is configured to provide reference time assistance information.

releasePreferenceConfig

Configuration for the UE to report assistance information to inform the gNB about the UE's preference to leave RRC_CONNECTED state.

rlm-RelaxationReportingConfig

Configuration for the UE to report the relaxation state of RLM measurements.

releasePreferenceProhibitTimer

Prohibit timer for release preference assistance information reporting. Value in seconds. Value s0 means prohibit timer is set to 0 seconds, value s0 means prohibit timer is set to 0.5 seconds, value s1 means prohibit timer is set to 1 second and so on. Value *infinity* means that once a UE has reported a release preference, the UE cannot report a release preference again during the RRC connection.

s-SearchDeltaP-Stationary

Parameter "SsearchDeltaP-StationaryConnected" in 5.7.4.4. Value dB2 corresponds to 2 dB, dB3 corresponds to 3 dB and so on.

scg-DeactivationPreferenceConfig

Configuration of the UE to indicate its preference for SCG deactivation.

scg -StatePreferenceProhibitTimer

Prohibit timer for UE indication of its preference for SCG deactivation. Value in seconds. Value s0 means prohibit timer is set to 0 seconds, value s1 means prohibit timer is set to 1 second and so on.

sensorNameList

Configuration for the UE to report measurements from specific sensors.

sl-AssistanceConfigNR

Indicate whether UE is configured to provide configured grant assistance information for NR sidelink communication.

sourceDAPS-FailureReporting

This field indicates whether the UE shall generate the SHR upon successfully completing the DAPS handover to the target cell and if a radio link failure was experienced in the source PCell while executing the DAPS handover. This field is set in the *otherConfig* configured by the source cell of the DAPS handover.

successHO-Confia

Configuration for the UE to report the successful handover information to the network.

t-SearchDeltaP-Stationary

Parameter "TsearchDeltaP-StationaryConnected" in 5.7.4.4. Value in seconds. Value s5 means 5 seconds, value s10 means 10 seconds and so on.

thresholdPercentageT304

This field indicates the threshold for the ratio in percentage between the elapsed T304 timer and the configured value of the T304 timer. Value *p40* corresponds to 40%, value *p60* corresponds to 60% and so on. This field is set in the *otherConfig* configured by the target cell of the handover.

thresholdPercentageT310

This field indicates the threshold for the ratio in percentage between the elapsed T310 timer and the configured value of the T310 timer. Value *p40* corresponds to 40%, value *p60* corresponds to 60% and so on. This field is set in the *otherConfig* configured by the source cell of the handover.

thresholdPercentageT312

This field indicates the threshold for the ratio in percentage between the elapsed T312 timer and the configured value(s) of the T312 timer. Value *p20* corresponds to 20%, value *p40* corresponds to 40% and so on. This field is set in the *otherConfig* configured by the source cell of the handover.

threshPropDelayDiff

Threshold for service link propagation delay difference report as specified in 5.7.4.2.

ul-GapFR2-PreferenceConfig

Indicates whether UE is configured to request for FR2 UL gap activation/deactivation and preferred FR2 UL gap pattern.

Conditional Presence	Explanation
maxBW	This field is optionally present, need R, if maxBW-PreferenceConfig-r16 is setup; otherwise it is absent, need R.
maxMIMO	This field is optionally present, need R, if maxMIMO-LayerPreferenceConfig-r16 is setup; otherwise it is absent, need R.
minOffset	This field is optionally present, need R, if minSchedulingOffsetPreferenceConfig-r16 is setup; otherwise it is absent, need R.
SCG	This field is optionally present, need M, in an RRCReconfiguration message not within mrdc-SecondaryCellGroup and received,
	either via SRB3 within DLInformationTransferMRDC or via SRB1. Otherwise, it is absent.

– PhysCellIdUTRA-FDD

The IE PhysCellIdUTRA-FDD is used to indicate the physical layer identity of the cell, i.e. the primary scrambling code, as defined in TS 25.331 [45].

PhysCellIdUTRA-FDD information element

- -- ASN1START
- -- TAG-PHYSCELLIDUTRA-FDD-START

PhysCellIdUTRA-FDD-r16 ::=

INTEGER (0..511)

- -- TAG-PHYSCELLIDUTRA-FDD-STOP
- -- ASN1STOP

RRC-TransactionIdentifier

The IE RRC-TransactionIdentifier is used, together with the message type, for the identification of an RRC procedure (transaction).

RRC-TransactionIdentifier information element

- -- ASN1START
- -- TAG-RRC-TRANSACTIONIDENTIFIER-START

```
RRC-TransactionIdentifier ::= INTEGER (0..3)

-- TAG-RRC-TRANSACTIONIDENTIFIER-STOP

-- ASN1STOP
```

Sensor-NameList

The IE Sensor-NameList is used to indicate the names of the sensors which the UE is configured to measure.

Sensor-NameList information element

Sensor-NameList field descriptions

measUncomBarPre

If configured, the UE reports the uncompensated Barometeric pressure measurement as defined in TS 37.355 [49].

measUeSpeed

If configured, the UE reports the UE speed measurement as defined in TS 37.355 [49].

measUeOrientation

If configured, the UE reports the UE orientation information as defined in TS 37.355 [49].

TraceReference

The TraceReference contains parameter Trace Reference as defined in TS 32.422 [52].

TraceReference information element

```
}
-- TAG-TRACEREFERENCE-STOP
-- ASN1STOP
```

UE-MeasurementsAvailable

The IE UE-Measurements Available is used to indicate all relevant available indicators for UE measurements.

UE-MeasurementsAvailable information element

```
-- ASN1START
-- TAG-UE-MeasurementsAvailable-START
                                              SEOUENCE {
UE-MeasurementsAvailable-r16 ::=
    logMeasAvailable-r16
                                                 ENUMERATED {true}
                                                                                  OPTIONAL,
    logMeasAvailableBT-r16
                                                 ENUMERATED {true}
                                                                                  OPTIONAL,
    logMeasAvailableWLAN-r16
                                                 ENUMERATED {true}
                                                                                  OPTIONAL,
    connEstFailInfoAvailable-r16
                                                 ENUMERATED {true}
                                                                                  OPTIONAL,
    rlf-InfoAvailable-r16
                                                 ENUMERATED {true}
                                                                                  OPTIONAL,
    . . . ,
    successHO-InfoAvailable-r17
                                                  ENUMERATED {true}
                                                                                  OPTIONAL,
    sigLogMeasConfigAvailable-r17
                                                  BOOLEAN
                                                                                  OPTIONAL
-- TAG-UE-MeasurementsAvailable-STOP
-- ASN1STOP
```

UTRA-FDD-Q-OffsetRange

The IE *UTRA-FDD-Q-OffsetRange* is used to indicate a frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value is in dB. Value *dB-24* corresponds to -24 dB, value *dB-22* corresponds to -22 dB and so on.

UTRA-FDD-Q-OffsetRange information element

```
-- TAG-UTRA-FDD-Q-OFFSETRANGE-STOP
-- ASN1STOP
```

VisitedCellInfoList

The IE *VisitedCellInfoList* includes the mobility history information of maximum of 16 most recently visited primary cells or time spent in any cell selection state and/or camped on any cell state in NR or E-UTRA and, in case of Dual Connectivity, the mobility history information of *maxPSCellHistory* most recently visited primary secondary cell group cells across all the primary cells included in the *VisitedCellInfoList*. The most recently visited cell is stored first in the list. The list includes cells visited in RRC_IDLE, RRC_INACTIVE and RRC_CONNECTED states for NR and RRC_IDLE and RRC_CONNECTED for E-UTRA.

VisitedCellInfoList information element

```
-- ASN1START
-- TAG-VISITEDCELLINFOLIST-START
VisitedCellInfoList-r16 ::= SEOUENCE (SIZE (1..maxCellHistory-r16)) OF VisitedCellInfo-r16
VisitedCellInfo-r16 ::= SEOUENCE {
    visitedCellId-r16
       nr-CellId-r16 CHOICE {
    cgi-Info CGI-Info-Logging-r16,
    pci-arfcn-r16 PCI-ARFCN-NR-r16
        eutra-CellId-r16 CHOICE {
           cellGlobalId-r16 CGI-InfoEUTRA,
           pci-arfcn-r16
                                        PCI-ARFCN-EUTRA-r16
                                             OPTIONAL.
    timeSpent-r16
                          INTEGER (0..4095),
    [ [
    visitedPSCellInfoListReport-r17
                                      VisitedPSCellInfoList-r17
                                                                                  OPTIONAL
VisitedPSCellInfoList-r17 ::= SEQUENCE (SIZE (1..maxPSCellHistory-r17)) OF VisitedPSCellInfo-r17
VisitedPSCellInfo-r17 ::=
                            SEOUENCE {
    visitedCellId-r17
                                CHOICE {
       nr-CellId-r17
                                 CHOICE {
           CellId-r17
cgi-Info-r17
pci-arfcn-r17
                                        CGI-Info-Logging-r16,
                                         PCI-ARFCN-NR-r16
        eutra-CellId-r17
                                CHOICE {
            cellGlobalId-r17 CGI-InfoEUTRALogging,
           pci-arfcn-r17
                                    PCI-ARFCN-EUTRA-r16
                                                     OPTIONAL,
    timeSpent-r17
                          INTEGER (0..4095),
```

```
}
-- TAG-VISITEDCELLINFOLIST-STOP
-- ASN1STOP
```

VisitedCellInfoList field descriptions

timeSpent

This field indicates the duration of stay in the cell or in any cell selection state and/or camped on any cell state in NR or E-UTRA approximated to the closest second. If included in *VisitedPSCellInfo*, it indicates the duration of stay in the PSCell or without any PSCell. If the duration of stay exceeds 4095s, the UE shall set it to 4095s.

visitedCellId

This field indicates the visited cell id including NR and E-UTRA cells.

WLAN-NameList

The IE WLAN-NameList is used to indicate the names of the WLAN AP for which the UE is configured to measure.

WLAN-NameList information element

```
-- ASN1START
-- TAG-WLANNAMELIST-START

WLAN-NameList-r16 ::= SEQUENCE (SIZE (1..maxWLAN-Name-r16)) OF WLAN-Name-r16

WLAN-Name-r16 ::= OCTET STRING (SIZE (1..32))

-- ASN1STOP
-- TAG-WLANNAMELIST-STOP
```

WLAN-NameList field descriptions

WLAN-Name

If configured, the UE only performs WLAN measurements according to the names identified. For each name, it refers to Service Set Identifier (SSID) defined in IEEE 802.11-2012 [50].

6.3.5 Sidelink information elements

SL-BWP-Config

The IE SL-BWP-Config is used to configure the UE specific NR sidelink communication on one particular sidelink bandwidth part.

SL-BWP-Config information element

-- ASN1START

```
-- TAG-SL-BWP-CONFIG-START
SL-BWP-Config-r16 ::=
                                        SEOUENCE {
    sl-BWP-Id
                                            BWP-Id.
    sl-BWP-Generic-r16
                                            SL-BWP-Generic-r16
                                                                                                 OPTIONAL.
                                                                                                              -- Need M
    sl-BWP-PoolConfig-r16
                                            SL-BWP-PoolConfig-r16
                                                                                                 OPTIONAL,
                                                                                                              -- Need M
    sl-BWP-PoolConfigPS-r17
                                        SetupRelease {SL-BWP-PoolConfig-r16}
                                                                                                 OPTIONAL,
                                                                                                              -- Need M
                                        SetupRelease {SL-BWP-DiscPoolConfig-r17}
    sl-BWP-DiscPoolConfig-r17
                                                                                                 OPTIONAL
                                                                                                              -- Need M
    11
SL-BWP-Generic-r16 ::=
                                        SEQUENCE {
    sl-BWP-r16
                                            BWP
                                                                                                               OPTIONAL.
                                                                                                                            -- Need M
    sl-LengthSymbols-r16
                                            ENUMERATED {sym7, sym8, sym9, sym10, sym11, sym12, sym13, sym14}
                                                                                                               OPTIONAL,
                                                                                                                           -- Need M
                                            ENUMERATED {sym0, sym1, sym2, sym3, sym4, sym5, sym6, sym7}
    sl-StartSymbol-r16
                                                                                                               OPTIONAL,
                                                                                                                            -- Need M
                                            SetupRelease {SL-PSBCH-Config-r16}
    sl-PSBCH-Config-r16
                                                                                                               OPTIONAL,
                                                                                                                           -- Need M
    sl-TxDirectCurrentLocation-r16
                                            INTEGER (0..3301)
                                                                                                               OPTIONAL,
                                                                                                                          -- Need M
-- TAG-SL-BWP-CONFIG-STOP
-- ASN1STOP
```

SL-BWP-Config field descriptions

sI-BWP-DiscPoolConfig

This field indicates the NR sidelink discovery dedicated resource pool configurations on the configured sidelink BWP. The total number of Rx/Tx resource pools configured for communication and discovery does not exceed the maximum number of Rx/Tx resource pool for NR sidelink communication (i.e. maxNrofRXPool-r16/maxNrofTXPool-r16).

sl-BWP-Generic

This field indicates the generic parameters on the configured sidelink BWP.

sI-BWP-PoolConfig

This field indicates the resource pool configurations on the configured sidelink BWP.

sI-BWP-Id

An identifier for this sidelink bandwidth part.

sI-BWP-PoolConfigPS

This field indicates the resource pool configurations for power saving on the configured sidelink BWP. This field does not include sI-TxPoolExceptional.

SL-BWP-Generic field descriptions

sl-LengthSymbols

This field indicates the number of symbols used for sidelink in a slot without SL-SSB. A single value can be (pre)configured per sidelink bandwidth part.

sl-StartSymbol

This field indicates the starting symbol used for sidelink in a slot without SL-SSB. A single value can be (pre)configured per sidelink bandwidth part.

sI-TxDirectCurrentLocation

The sidelink Tx/Rx Direct Current location for the carrier. Only values in the value range of this field between 0 and 3299, which indicate the subcarrier index within the carrier corresponding to the numerology of the corresponding sidelink BWP and value 3300, which indicates "Outside the carrier" and value 3301, which indicates "Undetermined position within the carrier" are used in this version of the specification.

SL-BWP-ConfigCommon

The IE SL-BWP-ConfigCommon is used to configure the cell-specific configuration information on one particular sidelink bandwidth part.

SL-BWP-ConfigCommon information element

```
-- ASN1START
-- TAG-SL-BWP-CONFIGCOMMON-START
SL-BWP-ConfigCommon-r16 ::=
                                         SEOUENCE {
    sl-BWP-Generic-r16
                                             SL-BWP-Generic-r16
                                                                                                         OPTIONAL.
                                                                                                                      -- Need R
    sl-BWP-PoolConfigCommon-r16
                                             SL-BWP-PoolConfigCommon-r16
                                                                                                         OPTIONAL,
                                                                                                                      -- Need R
    [ [
    sl-BWP-PoolConfigCommonPS-r17
                                             SL-BWP-PoolConfigCommon-r16
                                                                                                         OPTIONAL,
                                                                                                                      -- Need R
    sl-BWP-DiscPoolConfigCommon-r17
                                             SL-BWP-DiscPoolConfigCommon-r17
                                                                                                                      -- Need R
                                                                                                         OPTIONAL
    11
-- TAG-SL-BWP-CONFIGCOMMON-STOP
-- ASN1STOP
```

SL-BWP-ConfigCommon field descriptions

sI-BWP-DiscPoolConfigCommon

This field indicates the NR sidelink discovery dedicated resource pool configurations on the configured sidelink BWP. The total number of Rx/Tx resource pools configured for communication and discovery does not exceed the maximum number of Rx/Tx resource pool for NR sidelink communication (i.e. maxNrofRXPool-r16/maxNrofTXPool-r16).

sI-BWP-Generic

This field indicates the generic parameters on the configured sidelink BWP.

sI-BWP-PoolConfigCommon

This field indicates the resource pool configurations on the configured sidelink BWP.

sI-BWP-PoolConfigCommonPS

This field indicates the resource pool configurations for power saving on the configured sidelink BWP. This field does not include sI-TxPoolExceptional.

SL-BWP-DiscPoolConfig

The IE SL-BWP-DiscPoolConfig is used to configure UE specific NR sidelink discovery dedicated resource pool.

SL-BWP-DiscPoolConfig information element

```
-- ASN1START
-- TAG-SL-BWP-DISCPOOLCONFIG-START
SL-BWP-DiscPoolConfig-r17 ::=
                                     SEOUENCE {
    sl-DiscRxPool-r17
                                         SEQUENCE (SIZE (1..maxNrofRXPool-r16)) OF SL-ResourcePool-r16
                                                                                                              OPTIONAL,
                                                                                                                           -- Cond HO
    sl-DiscTxPoolSelected-r17
                                         SL-TxPoolDedicated-r16
                                                                                                              OPTIONAL,
                                                                                                                           -- Need M
    sl-DiscTxPoolScheduling-r17
                                        SL-TxPoolDedicated-r16
                                                                                                              OPTIONAL
                                                                                                                           -- Need N
```

```
-- TAG-SL-BWP-DISCPOOLCONFIG-STOP
-- ASN1STOP
```

SL-BWP-DiscPoolConfig field descriptions

sl-DiscTxPoolScheduling

Indicates the resources by which the UE is allowed to transmit NR sidelink discover based on network scheduling on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception.

When this field is configured together with *sl-TxPoolScheduling*, the resource pool index (which is used in DCI Format 3_0 in TS 38.212 [17], clause 7.3.1.4.1) is defined as 0, 1, ..., x-1 for the resource pools included in the *sl-TxPoolScheduling*, and x, x+1, ..., x+y-1 for the resource pools included in *sl-DiscTxPoolScheduling*, where x is the number of the resource pools in *sl-TxPoolScheduling*, and y is the number of resource pools in *sl-DiscTxPoolScheduling*.

Conditional Presence	Explanation
НО	This field is optionally present, need M, in an RRCReconfiguration message including reconfigurationWithSync; otherwise it is
	absent, need M.

SL-BWP-DiscPoolConfigCommon

The IE SL-BWP-DiscPoolConfigCommon is used to configure the cell-specific NR sidelink discovery dedicated resource pool.

SL-BWP-DiscPoolConfigCommon information element

SL-BWP-PoolConfig

The IE *SL-BWP-PoolConfig* is used to configure NR sidelink communication resource pool.

SL-BWP-PoolConfig information element

```
-- ASN1START
-- TAG-SL-BWP-POOLCONFIG-START
```

```
SL-BWP-PoolConfig-r16 ::=
    sl-RxPool-r16
                                     SEQUENCE (SIZE (1..maxNrofRXPool-r16)) OF SL-ResourcePool-r16
                                                                                                          OPTIONAL.
                                                                                                                       -- Cond HO
    sl-TxPoolSelectedNormal-r16
                                     SL-TxPoolDedicated-r16
                                                                                                          OPTIONAL.
                                                                                                                       -- Need M
    sl-TxPoolScheduling-r16
                                    SL-TxPoolDedicated-r16
                                                                                                          OPTIONAL.
                                                                                                                       -- Need N
    sl-TxPoolExceptional-r16
                                     SL-ResourcePoolConfig-r16
                                                                                                          OPTIONAL
                                                                                                                       -- Need M
SL-TxPoolDedicated-r16 ::=
                                 SEOUENCE {
    sl-PoolToReleaseList-r16
                                     SEQUENCE (SIZE (1..maxNrofTXPool-r16)) OF SL-ResourcePoolID-r16
                                                                                                          OPTIONAL.
                                                                                                                       -- Need N
    sl-PoolToAddModList-r16
                                     SEQUENCE (SIZE (1..maxNrofTXPool-r16)) OF SL-ResourcePoolConfig-r16 OPTIONAL
                                                                                                                       -- Need N
SL-ResourcePoolConfig-r16 ::=
                                 SEOUENCE {
    sl-ResourcePoolID-r16
                                     SL-ResourcePoolID-r16,
    sl-ResourcePool-r16
                                    SL-ResourcePool-r16
                                                                                                          OPTIONAL
                                                                                                                      -- Need M
SL-ResourcePoolID-r16 ::=
                                 INTEGER (1..maxNrofPoolID-r16)
-- TAG-SL-BWP-POOLCONFIG-STOP
-- ASN1STOP
```

SL-BWP-PoolConfig field descriptions

sl-RxPool

Indicates the receiving resource pool on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception. If the field is included, it replaces any previous list, i.e. all the entries of the list are replaced and each of the *SL-ResourcePool* entries is considered to be newly created.

sI-TxPoolExceptional

Indicates the resources by which the UE is allowed to transmit NR sidelink communication in exceptional conditions on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception.

sI-TxPoolScheduling

Indicates the resources by which the UE is allowed to transmit NR sidelink communication based on network scheduling on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception.

sI-TxPoolSelectedNormal

Indicates the resources by which the UE is allowed to transmit NR sidelink communication by UE autonomous resource selection on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception.

Conditional Presence	Explanation
НО	This field is optionally present, need M, in an RRCReconfiguration message including reconfigurationWithSync; otherwise it is
	absent, Need M.

SL-BWP-PoolConfigCommon

The IE SL-BWP-PoolConfigCommon is used to configure the cell-specific NR sidelink communication resource pool.

SL-BWP-PoolConfigCommon information element

```
-- ASN1START
-- TAG-SL-BWP-POOLCONFIGCOMMON-START
SL-BWP-PoolConfigCommon-r16 ::=
    sl-RxPool-r16
                                        SEQUENCE (SIZE (1..maxNrofRXPool-r16)) OF SL-ResourcePool-r16
                                                                                                                           -- Need R
                                                                                                              OPTIONAL,
                                                                                                                           -- Need R
    sl-TxPoolSelectedNormal-r16
                                        SEQUENCE (SIZE (1..maxNrofTXPool-r16)) OF SL-ResourcePoolConfig-r16 OPTIONAL,
                                                                                                              OPTIONAL
                                                                                                                           -- Need R
    sl-TxPoolExceptional-r16
                                        SL-ResourcePoolConfig-r16
-- TAG-SL-BWP-POOLCONFIGCOMMON-STOP
-- ASN1STOP
```

SL-BWP-PoolConfigCommon field descriptions

sI-TxPoolExceptional

Indicates the resources by which the UE is allowed to transmit NR sidelink communication in exceptional conditions on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception. This field is not present when SL-BWP-PoolConfigCommon is included in SidelinkPreconfigNR.

SL-CBR-PriorityTxConfigList

The IE *SL-CBR-PriorityTxConfigList* indicates the mapping between PSSCH transmission parameter (such as MCS, PRB number, retransmission number, CR limit) sets by using the indexes of the configurations provided in *sl-CBR-PSSCH-TxConfigList*, CBR ranges by an index to the entry of the CBR range configuration in *sl-CBR-RangeConfigList*, and priority ranges. It also indicates the default PSSCH transmission parameters to be used when CBR measurement results are not available, and MCS range for the MCS tables used in the resource pool.

SL-CBR-PriorityTxConfigList information element

```
-- ASN1START
-- TAG-SL-CBR-PRIORITYTXCONFIGLIST-START
SL-CBR-PriorityTxConfigList-r16 ::= SEQUENCE (SIZE (1..8)) OF SL-PriorityTxConfigIndex-r16
SL-CBR-PriorityTxConfigList-v1650 ::= SEQUENCE (SIZE (1..8)) OF SL-PriorityTxConfigIndex-v1650
SL-PriorityTxConfigIndex-r16 ::= SEQUENCE {
    sl-PriorityThreshold-r16
                                     INTEGER (1..8)
                                                                                                                      OPTIONAL,
                                                                                                                                    -- Need M
    sl-DefaultTxConfigIndex-r16 INTEGER (0..maxCBR-Level-1-r16)
sl-CBR-ConfigIndex-r16 INTEGER (0..maxCBR-Config-1-r16)
sl-Tx-ConfigIndexList-r16 SEQUENCE (SIZE (1..maxCBR-Level
                                                                                                                      OPTIONAL,
                                                                                                                                    -- Need M
                                                                                                                      OPTIONAL,
                                                                                                                                    -- Need M
    sl-Tx-ConfigIndexList-r16
                                             SEQUENCE (SIZE (1.. maxCBR-Level-r16)) OF SL-TxConfigIndex-r16
                                                                                                                     OPTIONAL
                                                                                                                                    -- Need M
SL-PriorityTxConfigIndex-v1650 ::= SEOUENCE {
    sl-MCS-RangeList-r16
                                            SEOUENCE (SIZE (1..maxCBR-Level-r16)) OF SL-MinMaxMCS-List-r16
                                                                                                                      OPTIONAL
                                                                                                                                    -- Need M
SL-TxConfigIndex-r16 ::=
                                       INTEGER (0..maxTxConfig-1-r16)
```

-- TAG-SL-CBR-PRIORITYTXCONFIGLIST-STOP
-- ASN1STOP

SL-CBR-PriorityTxConfigList field descriptions

sI-CBR-ConfigIndex

Indicates the CBR ranges to be used by an index to the entry of the CBR range configuration in sI-CBR-RangeConfigList.

sI-DefaultTxConfigIndex

Indicates the PSSCH transmission parameters to be used by the UEs which do not have available CBR measurement results, by means of an index to the corresponding entry in *sl-Tx-ConfigIndexList*. Value 0 indicates the first entry in *sl-Tx-ConfigIndexList*. The field is ignored if the UE has available CBR measurement results.

sI-MCS-RangeList

Indicates the minimum MCS value and maximum MCS value for the associated MCS table(s). UE shall ignore the minimum MCS value and maximum MCS value used for table of 64QAM indicated in SL-CBR-PriorityTxConfigList-r16 if SL-CBR-PriorityTxConfigList-v1650 is present.

sI-PriorityThreshold

Indicates the upper bound of priority range which is associated with the configurations in sl-CBR-ConfigIndex and in sl-Tx-ConfigIndexList. The upper bounds of the priority ranges are configured in ascending order for consecutive entries of SL-PriorityTxConfigIndex in SL-CBR-PriorityTxConfigList. For the first entry of SL-PriorityTxConfigIndex, the lower bound of the priority range is 1.

SL-CBR-PriorityTxConfigList-v1650

If included, it includes the same number of entries, and listed in the same order, as in SL-CBR-PriorityTxConfigList-r16.

SL-CBR-CommonTxConfigList

The IE *SL-CBR-CommonTxConfigList* indicates the list of PSSCH transmission parameters (such as MCS, sub-channel number, retransmission number, CR limit) in *sl-CBR-PSSCH-TxConfigList*, and the list of CBR ranges in *sl-CBR-RangeConfigList*, to configure congestion control to the UE for sidelink communication.

SL-CBR-CommonTxConfigList information element

```
-- ASN1START
-- TAG-SL-CBR-COMMONTXCONFIGLIST-START
                                    SEOUENCE {
SL-CBR-CommonTxConfigList-r16 ::=
   sl-CBR-RangeConfigList-r16
                                        SEQUENCE (SIZE (1..maxCBR-Config-r16)) OF SL-CBR-LevelsConfig-r16
                                                                                                            OPTIONAL, -- Need M
    sl-CBR-PSSCH-TxConfigList-r16
                                        SEQUENCE (SIZE (1.. maxTxConfig-r16)) OF SL-CBR-PSSCH-TxConfig-r16
                                                                                                            OPTIONAL
                                                                                                                        -- Need M
                                    SEQUENCE (SIZE (1..maxCBR-Level-r16)) OF SL-CBR-r16
SL-CBR-LevelsConfig-r16 ::=
SL-CBR-PSSCH-TxConfig-r16 ::=
                                     SEQUENCE {
                                        INTEGER(0..10000)
   sl-CR-Limit-r16
                                                                                                             OPTIONAL, -- Need M
                                        SL-PSSCH-TxParameters-r16
   sl-TxParameters-r16
                                                                                                             OPTIONAL
                                                                                                                        -- Need M
SL-CBR-r16 ::=
                                     INTEGER (0..100)
-- TAG-SL-CBR-COMMONTXCONFIGLIST-STOP
-- ASN1STOP
```

SL-CBR-CommonTxConfigList field descriptions

sI-CBR-RangeConfigList

Indicates the list of CBR ranges. Each entry of the list indicates in *SL-CBR-LevelsConfig* the upper bound of the CBR range for the respective entry. The upper bounds of the CBR ranges are configured in ascending order for consecutive entries of *sl-CBR-RangeConfigList*. For the first entry of *sl-CBR-RangeConfigList* the lower bound of the CBR range is 0. Value 0 corresponds to 0, value 1 to 0.01, value 2 to 0.02, and so on.

sI-CR-Limit

Indicates the maximum limit on the occupancy ratio. Value 0 corresponds to 0, value 1 to 0.0001, value 2 to 0.0002, and so on (i.e. in steps of 0.0001) until value 10000, which corresponds to 1.

sI-CBR-PSSCH-TxConfigList

Indicates the list of available PSSCH transmission parameters (such as MCS, sub-channel number, retransmission number and CR limit) configurations.

sI-TxParameters

Indicates PSSCH transmission parameters.

SL-ConfigDedicatedNR

The IE SL-ConfigDedicatedNR specifies the dedicated configuration information for NR sidelink communication.

SL-ConfigDedicatedNR information element

```
-- ASN1START
-- TAG-SL-CONFIGDEDICATEDNR-START
SL-ConfigDedicatedNR-r16 ::=
                                     SEOUENCE {
    sl-PHY-MAC-RLC-Config-r16
                                         SL-PHY-MAC-RLC-Config-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need M
                                         SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SLRB-Uu-ConfigIndex-r16
    sl-RadioBearerToReleaseList-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need N
    sl-RadioBearerToAddModList-r16
                                         SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SL-RadioBearerConfig-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need N
                                         SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-DestinationIndex-r16
    sl-MeasConfigInfoToReleaseList-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need N
    sl-MeasConfigInfoToAddModList-r16
                                         SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-MeasConfigInfo-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need N
    t400-r16
                                         ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000}
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need M
    [ [
    sl-PHY-MAC-RLC-Config-v1700
                                         SetupRelease { SL-PHY-MAC-RLC-Config-v1700 }
                                                                                                                 OPTIONAL,
                                                                                                                               -- Need M
    sl-DiscConfig-r17
                                         SetupRelease { SL-DiscConfig-r17}
                                                                                                                 OPTIONAL
                                                                                                                               -- Need M
    ]]
SL-DestinationIndex-r16 ::=
                                         INTEGER (0..maxNrofSL-Dest-1-r16)
SL-PHY-MAC-RLC-Config-r16::=
                                     SEQUENCE {
    sl-ScheduledConfig-r16
                                         SetupRelease { SL-ScheduledConfig-r16 }
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need M
    sl-UE-SelectedConfig-r16
                                         SetupRelease { SL-UE-SelectedConfig-r16 }
                                                                                                                 OPTIONAL,
                                                                                                                               -- Need M
    sl-FreqInfoToReleaseList-r16
                                         SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-Freq-Id-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need N
    sl-FreqInfoToAddModList-r16
                                         SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfig-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need N
                                         SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfigIndex-r16
                                                                                                                 OPTIONAL,
    sl-RLC-BearerToReleaseList-r16
                                                                                                                              -- Need N
    sl-RLC-BearerToAddModList-r16
                                         SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfig-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need N
    sl-MaxNumConsecutiveDTX-r16
                                         ENUMERATED {n1, n2, n3, n4, n6, n8, n16, n32}
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need M
                                         ENUMERATED {enabled}
    sl-CSI-Acquisition-r16
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
    sl-CSI-SchedulingRequestId-r16
                                         SetupRelease {SchedulingRequestId}
                                                                                                                              -- Need M
                                                                                                                 OPTIONAL,
    sl-SSB-PriorityNR-r16
                                         INTEGER (1..8)
                                                                                                                 OPTIONAL,
                                                                                                                              -- Need R
```

```
ENUMERATED {on, off}
    networkControlledSyncTx-r16
                                                                                                              OPTIONAL
                                                                                                                           -- Need M
SL-PHY-MAC-RLC-Config-v1700 ::=
                                    SEOUENCE {
    sl-DRX-Config-r17
                                        SL-DRX-Config-r17
                                                                                                              OPTIONAL.
                                                                                                                         -- Need M
    sl-RLC-ChannelToReleaseList-r17
                                        SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-ChannelID-r17
                                                                                                              OPTIONAL, -- Cond L2U2N
    sl-RLC-ChannelToAddModList-r17
                                        SEOUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-ChannelConfig-r17
                                                                                                              OPTIONAL, -- Cond L2U2N
SL-DiscConfig-r17::=
                                    SEQUENCE {
    sl-RelayUE-Config-r17
                                        SetupRelease { SL-RelayUE-Config-r17}
                                                                                                              OPTIONAL, -- Cond L2RelayUE
                                                                                                              OPTIONAL -- Cond L2RemoteUE
    sl-RemoteUE-Config-r17
                                        SetupRelease { SL-RemoteUE-Config-r17}
```

SL-ConfigDedicatedNR field descriptions

sl-MeasConfigInfoToAddModList

-- TAG-SL-CONFIGDEDICATEDNR-STOP

-- ASN1STOP

This field indicates the RSRP measurement configurations for unicast destinations to add and/or modify.

sl-MeasConfigInfoToReleaseList

This field indicates the RSRP measurement configurations for unicast destinations to remove.

sI-PHY-MAC-RLC-Config

This field indicates the lower layer sidelink radio bearer configurations.

sl-RadioBearerToAddModList

This field indicates one or multiple sidelink radio bearer configurations to add and/or modify. This field is not configured to the PC5 connection used for L2 U2N relay operation.

sl-RadioBearerToReleaseList

This field indicates one or multiple sidelink radio bearer configurations to remove. This field is not configured to the PC5 connection used for L2 U2N relay operation.

SL-PHY-MAC-RLC-Config field descriptions

networkControlledSyncTx

This field indicates whether the UE shall transmit synchronisation information (i.e. become synchronisation source). Value *on* indicates the UE to transmit synchronisation information while value *off* indicates the UE to not transmit such information.

sI-DRX-Config

This field indicates the sidelink DRX configuration(s) for unicast, groupcast and/or broadcast communication, as specified in TS 38.321 [3].

sl-MaxNumConsecutiveDTX

This field indicates the maximum number of consecutive HARQ DTX before triggering sidelink RLF. Value n1 corresponds to 1, value n2 corresponds to 2, and so on.

sI-FreqInfoToAddModList

This field indicates the NR sidelink communication configuration on some carrier frequency (ies) to add and/or modify. In this release, only one entry can be configured in the list.

sI-FreqInfoToReleaseList

This field indicates the NR sidelink communication configuration on some carrier frequency (ies) to remove. In this release, only one entry can be configured in the list.

sI-RLC-BearerToAddModList

This field indicates one or multiple sidelink RLC bearer configurations to add and/or modify.

sI-RLC-BearerToReleaseList

This field indicates one or multiple sidelink RLC bearer configurations to remove.

sI-RLC-ChannelToAddModList

This field indicates one or multiple PC5 Relay RLC Channel configurations to add and/or modify. Each PC5 Relay RLC channel configuration provided by network to L2 U2N Relay UE is uniquely associated with one L2 U2N Remote UE.

sl-RLC-ChannelToReleaseList

This field indicates one or multiple PC5 Relay RLC Channel configurations to remove.

sI-ScheduledConfig

Indicates the configuration for UE to transmit NR sidelink communication based on network scheduling. This field is not configured simultaneously with sI-UE-SelectedConfig. This field is not configured to a L2 U2N Remote UE.

sI-UE-SelectedConfia

Indicates the configuration used for UE autonomous resource selection. This field is not configured simultaneously with sI-ScheduledConfig.

sI-CSI-Acquisition

Indicates whether CSI reporting is enabled in sidelink unicast. If the field is absent, sidelink CSI reporting is disabled.

sI-CSI-SchedulingRequestId

If present, it indicates the scheduling request configuration applicable for Sidelink CSI Reporting MAC CE and Sidelink DRX Command MAC CE, as specified in TS 38.321 [3].

sI-SSB-PrioritvNR

This field indicates the priority of NR sidelink SSB transmission and reception.

Conditional Presence	Explanation
L2RelayUE	For L2 U2N Relay UE, the field is optionally present, Need M. Otherwise, it is absent.
L2RemoteUE	For L2 U2N Remote UE, the field is optionally present, Need M. Otherwise, it is absent.
L2U2N	The field is optional present for L2 U2N Relay UE and L2 U2N Remote UE, need N. Otherwise, it is absent.

SL-ConfiguredGrantConfig

The IE SL-ConfiguredGrantConfig specifies the configured grant configuration information for NR sidelink communication.

SL-ConfiguredGrantConfig information element

```
-- ASN1START
-- TAG-SL-CONFIGUREDGRANTCONFIG-START
SL-ConfiguredGrantConfig-r16 ::=
                                           SEQUENCE {
    sl-ConfigIndexCG-r16
                                               SL-ConfigIndexCG-r16,
    sl-PeriodCG-r16
                                               SL-PeriodCG-r16
                                                                                                                      OPTIONAL, -- Need M
    sl-NrOfHARQ-Processes-r16
                                               INTEGER (1..16)
                                                                                                                      OPTIONAL, -- Need M
    sl-HARQ-ProcID-offset-r16
                                                                                                                      OPTIONAL, -- Need M
                                              INTEGER (0..15)
                                                                                                                      OPTIONAL, -- Need M
    sl-CG-MaxTransNumList-r16
                                            SL-CG-MaxTransNumList-r16
    rrc-ConfiguredSidelinkGrant-r16
                                              SEOUENCE {
        sl-TimeResourceCG-Type1-r16
                                                   INTEGER (0..496)
                                                                                                                      OPTIONAL, -- Need M
       sl-StartSubchannelCG-Type1-r16
                                                   INTEGER (0..26)
                                                                                                                      OPTIONAL, -- Need M
        sl-FreqResourceCG-Type1-r16
                                                                                                                      OPTIONAL, -- Need M
                                                   INTEGER (0..6929)
                                                                                                                      OPTIONAL, -- Need R
        sl-TimeOffsetCG-Type1-r16
                                                   INTEGER (0..7999)
        sl-N1PUCCH-AN-r16
                                                                                                                      OPTIONAL, -- Need M
                                                   PUCCH-ResourceId
                                                                                                                      OPTIONAL, -- Need M
        sl-PSFCH-ToPUCCH-CG-Type1-r16
                                                   INTEGER (0..15)
        sl-ResourcePoolID-r16
                                                   SL-ResourcePoolID-r16
                                                                                                                      OPTIONAL, -- Need M
        sl-TimeReferenceSFN-Type1-r16
                                                   ENUMERATED {sfn512}
                                                                                                                      OPTIONAL -- Need S
                                                                                                                      OPTIONAL, -- Need M
    11
    sl-N1PUCCH-AN-Type2-r16
                                               PUCCH-ResourceId
                                                                                                                      OPTIONAL -- Need M
    11
SL-ConfigIndexCG-r16 ::=
                                  INTEGER (0..maxNrofCG-SL-1-r16)
SL-CG-MaxTransNumList-r16 ::=
                                  SEQUENCE (SIZE (1..8)) OF SL-CG-MaxTransNum-r16
SL-CG-MaxTransNum-r16 ::=
                                           SEQUENCE {
    sl-Priority-r16
                                               INTEGER (1..8),
    sl-MaxTransNum-r16
                                               INTEGER (1..32)
SL-PeriodCG-r16 ::=
                               CHOICE {
    sl-PeriodCG1-r16
                                   ENUMERATED {ms100, ms200, ms300, ms400, ms500, ms600, ms700, ms800, ms900, ms1000, spare6,
                                               spare5, spare4, spare3, spare2, spare1},
    sl-PeriodCG2-r16
                                   INTEGER (1..99)
-- TAG-SL-CONFIGUREDGRANTCONFIG-STOP
-- ASN1STOP
```

SL-ConfiguredGrantConfig field descriptions

sl-ConfigIndexCG

This field indicates the ID to identify configured grant for sidelink.

sI-CG-MaxTransNumList

This field indicates the maximum number of times that a TB can be transmitted using the resources provided by the configured grant. sl-Priority corresponds to the logical channel priority.

sI-FreqResourceCG-Type1

Indicates the frequency resource location of sidelink configured grant type 1. An index giving valid combinations of one or two starting sub-channel and length (jointly encoded) as resource indicator value (RIV), as defined in TS 38.214 [19].

sI-HARQ-ProcID-Offset

Indicates the offset used in deriving the HARQ process ID for SL configured grant type 1 or SL configured type 2, see TS 38.321 [3], clause 5.8.3.

sI-N1PUCCH-AN

This field indicates the HARQ resource for PUCCH for sidelink configured grant type 1. The actual PUCCH-Resource is configured in sI-PUCCH-Config and referred to by its ID.

sI-N1PUCCH-AN-Type2

This field indicates the HARQ resource for PUCCH for PSCCH/PSSCH transmissions without a corresponding PDCCH on sidelink configured grant type 2. The actual PUCCH-Resource is configured in *sl-PUCCH-Config* and referred to by its ID.

sI-NrOfHARQ-Processes

This field indicates the number of HARQ processes configured for a specific configured grant. It applies for both Type 1 and Type 2.

sI-PeriodCG

This field indicates the period of sidelink configured grant in the unit of ms.

sI-PSFCH-ToPUCCH-CG-Type1

This field, for configured grant type 1, indicates slot offset between the PSFCH associated with the last PSSCH resource of each period and the PUCCH occasion used for reporting sidelink HARQ.

sl-ResourcePoolID

Indicates the resource pool in which the configured sidelink grant Type 1 is applied.

sI-StartSubchannelCG-Type1

This field indicates the starting sub-channel of sidelink configured grant Type 1. An index giving valid sub-channel index.

sI-TimeOffsetCG-Type1

This field indicates the slot offset with respect to logical slot defined by sl-TimeReferenceSFN-Type1, as specified in TS 38.321 [3].

sI-TimeReferenceSFN-Type1

Indicates SFN used for determination of the offset of a resource in time domain. If it is present, the UE uses the 1st logical slot of associated resource pool after the starting time of the closest SFN with the indicated number preceding the reception of the sidelink configured grant configuration Type 1 as reference logical slot, see TS 38.321 [3], clause 5.8.3. If it is not present, the reference SFN is 0.

sI-TimeResourceCG-Type1

This field indicates the time resource location of sidelink configured grant Type 1. An index giving valid combinations of up to two slot positions (jointly encoded) as time resource indicator value (TRIV), as defined in TS 38.212 [17].

SL-DestinationIdentity

The IE SL-DestinationIdentity is used to identify a destination of a NR sidelink communication.

SL-DestinationIdentity information element

```
-- TAG-SL-DESTINATIONIDENTITY-START

SL-DestinationIdentity-r16 ::= BIT STRING (SIZE (24))

-- TAG-SL-DESTINATIONIDENTITY-STOP

-- ASN1STOP
```

SL-DRX-Config

The IE SL-DRX-Config is used to configure DRX related parameters for NR sidelink communication/discovery. The SL DRX timers should be calculated in the unit of physical slot.

SL-DRX-Config information element

```
-- ASN1START
-- TAG-SL-DRX-CONFIG-START
SL-DRX-Config-r17 ::=
                                           SEOUENCE {
    sl-DRX-ConfigGC-BC-r17
                                               SL-DRX-ConfigGC-BC-r17
                                                                                                                      OPTIONAL,
                                                                                                                                    -- Cond HO
    sl-DRX-ConfigUC-ToReleaseList-r17
                                               SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-DestinationIndex-r16
                                                                                                                      OPTIONAL,
                                                                                                                                    -- Need N
    sl-DRX-ConfigUC-ToAddModList-r17
                                              SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-DRX-ConfigUC-Info-r17
                                                                                                                      OPTIONAL,
                                                                                                                                    -- Need N
SL-DRX-ConfigUC-Info-r17 ::=
                                           SEOUENCE {
    sl-DestinationIndex-r17
                                               SL-DestinationIndex-r16
                                                                                                                      OPTIONAL,
                                                                                                                                    -- Need N
    sl-DRX-ConfigUC-r17
                                               SL-DRX-ConfigUC-r17
                                                                                                                                    -- Need N
                                                                                                                      OPTIONAL,
-- TAG-SL-DRX-CONFIG-STOP
-- ASN1STOP
```

SL-DRX-Config field descriptions

sI-DRX-ConfigGC-BC

This field indicates the sidelink DRX configurations for groupcast and broadcast communication, as specified in TS 38.321 [3].

sI-DRX-ConfigUC-ToReleaseList

This field indicates the sidelink DRX configurations for corresponding unicast destinations to remove.

sI-DRX-ConfigUC-ToAddModList

This field indicates the sidelink DRX configurations for corresponding unicast destinations to add and/or modify.

Conditional Presence	Explanation
НО	This field is optionally present, need M, in an RRCReconfiguration message including reconfigurationWithSync; otherwise it is
	absent. Need M.

SL-DRX-ConfigGC-BC

The IE *SL-DRX-ConfigGC-BC* is used to configure DRX related parameters for NR sidelink groupcast and broadcast communication, unicast/broadcast based communication of Direct Link Establishment Request (TS 24.587 [57]), and discovery message (TS 24.554 [72]).

SL-DRX-ConfigGC-BC information element

```
-- ASN1START
-- TAG-SL-DRX-CONFIGGC-BC-START
SL-DRX-ConfigGC-BC-r17 ::=
                               SEOUENCE {
    sl-DRX-GC-BC-PerOoS-List-r17 SEOUENCE (SIZE (1..maxSL-GC-BC-DRX-OOS-r17)) OF SL-DRX-GC-BC-OOS-r17
                                                                                                                OPTIONAL,
                                                                                                                             -- Need M
    sl-DRX-GC-generic-r17
                                   SL-DRX-GC-Generic-r17
                                                                                                                OPTIONAL,
                                                                                                                             -- Need M
    sl-DefaultDRX-GC-BC-r17
                                   SL-DRX-GC-BC-QoS-r17
                                                                                                                OPTIONAL,
                                                                                                                             -- Need M
SL-DRX-GC-BC-OoS-r17 ::=
                                    SEQUENCE
    sl-DRX-GC-BC-MappedOoS-FlowList-r17 SEQUENCE (SIZE (1..maxNrofSL-OFIs-r16)) OF SL-OoS-Profile-r16
                                                                                                           OPTIONAL.
                                                                                                                         -- Need M
    sl-DRX-GC-BC-OnDurationTimer-r17
                                                subMilliSeconds INTEGER (1..31),
                                                milliSeconds
                                                               ENUMERATED {
                                                      ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60,
                                                      ms80, ms100, ms200, ms300, ms400, ms500, ms600, ms800, ms1000, ms1200,
                                                      ms1600, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1}
    sl-DRX-GC-InactivityTimer-r17
                                            ENUMERATED {
                                                ms0, ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60, ms80,
                                                ms100, ms200, ms300, ms500, ms750, ms1280, ms1920, ms2560, spare9, spare8,
                                                spare7, spare6, spare5, spare4, spare3, spare2, spare1},
    sl-DRX-GC-BC-Cycle-r17
                                            ENUMERATED {
                                                ms10, ms20, ms32, ms40, ms60, ms64, ms70, ms80, ms128, ms160, ms256, ms320, ms512,
                                                ms640, ms1024, ms1280, ms2048, ms2560, ms5120, ms10240, spare12, spare11, spare10,
                                                spare9, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1,
SL-DRX-GC-Generic-r17 ::=
                                       SEOUENCE {
    sl-DRX-GC-HARO-RTT-Timer1-r17
                                            ENUMERATED {s10, s11, s12, s14, spare4, spare3, spare2, spare1}
                                                                                                                  OPTIONAL, -- Need M
    sl-DRX-GC-HARO-RTT-Timer2-r17
                                            ENUMERATED {sl0, sl1, sl2, sl4, spare4, spare3, spare2, spare1}
                                                                                                                  OPTIONAL, -- Need M
    sl-DRX-GC-RetransmissionTimer-r17
                                                s10, s11, s12, s14, s16, s18, s116, s124, s133, s140, s164, s180, s196, s1112, s1128,
                                                sl160, sl320, spare15, spare14, spare13, spare12, spare11, spare10, spare9, spare8,
                                                spare7, spare6, spare5, spare4, spare3, spare2, spare1}
-- TAG-SL-DRX-CONFIGGC-BC-STOP
-- ASN1STOP
```

SL-DRX-ConfigGC-BC field descriptions

sI-DefaultDRX-GC-BC

Indicates the default sidelink DRX configuration for groupcast and broadcast communications, which is used for QoS profile(s) that cannot be mapped into DRX configuration(s) configured for dedicated QoS profile(s). This field can be applied for the broadcast based or unicast based communication of Direct Link Establishment Request as described in TS 24.587 [57] and discovery message as described in TS 24.554 [72].

sI-DRX-GC-BC-PerQoS-List

List of one or multiple sidelink DRX configurations for groupcast and broadcast communication, which are mapped from QoS profile(s).

sI-DRX-GC-BC-Cycle

Value in ms, ms10 corresponds to 10ms, ms20 corresponds to 20 ms, ms32 corresponds to 32 ms, and so on.

sI-DRX-GC-BC-MappedQoS-FlowsList

List of QoS profiles of the NR sidelink communication, which are mapped to a sidelink DRX configuration.

sI-DRX-GC-BC-OnDurationTimer

Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSecond). For the latter, value ms1 corresponds to 1 ms, value ms2 corresponds to 2 ms, and so on.

sI-DRX-GC-HARQ-RTT-Timer1. sI-DRX-GC-HARQ-RTT-Timer2

Value in number of slot lengths of the BWP where the transport block was received. Value sl0 corresponds to 0 slots, sl1 corresponds to 1 slot, sl2 corresponds to 2 slots, and so on. sl-DRX-GC-HARQ-RTT-Timer1 is used for HARQ feedback enabled sidelink retransmission if SCI does not indicate retransmission resource(s). sl-DRX-GC-HARQ-RTT-Timer2 is used for HARQ feedback disabled sidelink retransmission in resource pool configured with PSFCH if SCI does not indicate retransmission resource(s).

sI-DRX-GC-Generic

Indicates a sidelink DRX configuration for groupcast communication, which is applicable to any QoS profile or any Destination Layer-2 ID.

sI-DRX-GC-InactivityTimer

Value in multiple integers of 1 ms, ms0 corresponds to 0, ms1 corresponds to 1 ms, ms2 corresponds to 2 ms, and so on. This field is only valid for groupcast communication.

sI-DRX-GC-RetransmissionTimer

Value in number of slot lengths of the BWP where the transport block was received. Value sl0 corresponds to 0 slots, sl1 corresponds to 1 slot, sl2 corresponds to 2 slots, and so on.

SL-DRX-ConfigUC

The IE SL-DRX-ConfigUC is used to configure sidelink DRX related parameters for unicast communication.

SL-DRX-ConfigUC information element

```
-- ASN1START
-- TAG-DRX-CONFIGUC-START
SL-DRX-ConfigUC-r17 ::=
                                        SEOUENCE {
    sl-drx-onDurationTimer-r17
                                            CHOICE
                                                subMilliSeconds INTEGER (1..31),
                                                                ENUMERATED {
                                                milliSeconds
                                                    ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60,
                                                    ms80, ms100, ms200, ms300, ms400, ms500, ms600, ms800, ms1000, ms1200,
                                                    ms1600, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1}
    sl-drx-InactivityTimer-r17
                                            ENUMERATED {
                                                ms0, ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60, ms80,
                                                ms100, ms200, ms300, ms500, ms750, ms1280, ms1920, ms2560, spare9, spare8,
                                                spare7, spare6, spare5, spare4, spare3, spare2, spare1},
    sl-drx-HARQ-RTT-Timer1-r17
                                            ENUMERATED {s10, s11, s12, s14, spare4, spare3, spare2, spare1}
                                                                                                                OPTIONAL, -- Need M
```

```
sl-drx-HARO-RTT-Timer2-r17
                                            ENUMERATED {s10, s11, s12, s14, spare4, spare3, spare2, spare1}
                                                                                                                 OPTIONAL, -- Need M
    sl-drx-RetransmissionTimer-r17
                                            ENUMERATED
                                                s10, s11, s12, s14, s16, s18, s116, s124, s133, s140, s164, s180, s196, s1112, s1128,
                                                sl160, sl320, sparel5, sparel4, sparel3, sparel2, sparel1, sparel0, spare9,
                                                spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1},
    sl-drx-CycleStartOffset-r17
                                        CHOICE {
        ms10
                                            INTEGER(0..9),
        ms20
                                            INTEGER(0..19),
        ms32
                                            INTEGER(0..31),
        ms40
                                            INTEGER(0..39),
        ms60
                                            INTEGER(0..59),
        ms64
                                            INTEGER(0..63),
        ms70
                                            INTEGER(0..69),
        ms80
                                            INTEGER(0..79),
        ms128
                                            INTEGER(0..127),
        ms160
                                            INTEGER(0..159),
        ms256
                                            INTEGER(0..255),
        ms320
                                            INTEGER(0..319),
        ms512
                                            INTEGER(0..511),
        ms640
                                            INTEGER(0..639),
        ms1024
                                            INTEGER(0..1023),
        ms1280
                                            INTEGER(0..1279),
        ms2048
                                            INTEGER(0..2047),
        ms2560
                                            INTEGER(0..2559),
        ms5120
                                            INTEGER(0..5119),
        ms10240
                                            INTEGER(0..10239)
    sl-drx-SlotOffset
                                            INTEGER (0..31)
-- TAG-SL-DRX-CONFIGUC-STOP
-- ASN1STOP
```

SL-DRX-ConfigUC field descriptions

sl-drx-CycleStartOffset

Sidelink drx-Cycle in ms and sidelink drx-StartOffset in multiples of 1 ms.

sl-drx-HARQ-RTT-Timer1, sl-drx-HARQ-RTT-Timer2

Value in number of slot lengths of the BWP where the transport block was received. Value sl0 corresponds to 0 slots, sl1 corresponds to 1 slot, sl2 corresponds to 2 slots, and so on. *sl-drx-HARQ-RTT-Timer1* is used for HARQ feedback enabled sidelink retransmission if SCI does not indicate retransmission resource(s). *sl-drx-HARQ-RTT-Timer2* is used for HARQ feedback disabled sidelink retransmission in resource pool configured with PSFCH if SCI does not indicate retransmission resource(s).

sl-drx-InactivityTimer

Value in number of slot lengths of the BWP where the transport block was received, sl0 corresponds to 0, sl1 corresponds to 1 slot, sl2 corresponds to 2 slots, and so on.

sl-drx-onDurationTimer

Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSecond). For the latter, value ms1 corresponds to 1 ms, value ms2 corresponds to 2 ms, and so on.

sI-drx-RetransmissionTimer

Value in number of slot lengths of the BWP where the transport block was received. Value sl0 corresponds to 0 slots, sl1 corresponds to 1 slot, sl2 corresponds to 2 slots, and so on.

sl-drx-SlotOffset

Value in 1/32 ms. Value 0 corresponds to 0 ms, value 1 corresponds to 1/32 ms, value 2 corresponds to 2/32 ms, and so on.

SL-DRX-ConfigUC-SemiStatic

The IE SL-DRX-Config UC-SemiStatic is used to indicate the semi-static sidelink DRX related parameters for unicast communication.

SL-DRX-ConfigUC-SemiStatic information element

```
-- ASN1START
-- TAG-DRX-CONFIGUCSEMISTATIC-START
SL-DRX-ConfigUC-SemiStatic-r17 ::=
                                             SEQUENCE {
    sl-drx-onDurationTimer-r17
                                                 CHOICE {
                                                     subMilliSeconds INTEGER (1..31),
                                                                    ENUMERATED {
                                                     milliSeconds
                                                         ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60,
                                                         ms80, ms100, ms200, ms300, ms400, ms500, ms600, ms800, ms1000, ms1200,
                                                         ms1600, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1}
    sl-drx-CycleStartOffset-r17
                                                 CHOICE {
        ms10
                                                     INTEGER(0..9),
        ms20
                                                     INTEGER(0..19),
        ms32
                                                     INTEGER(0..31),
        ms40
                                                     INTEGER (0..39),
        ms60
                                                     INTEGER(0..59),
        ms64
                                                     INTEGER(0..63),
        ms70
                                                     INTEGER(0..69),
        ms80
                                                     INTEGER(0..79),
        ms128
                                                     INTEGER (0..127),
        ms160
                                                     INTEGER (0..159),
        ms256
                                                     INTEGER (0..255),
        ms320
                                                     INTEGER(0..319),
        ms512
                                                     INTEGER(0..511),
```

```
ms640
                                                     INTEGER(0..639),
        ms1024
                                                     INTEGER(0..1023),
        ms1280
                                                     INTEGER(0..1279),
        ms2048
                                                     INTEGER(0..2047),
        ms2560
                                                     INTEGER(0..2559),
       ms5120
                                                     INTEGER(0..5119),
        ms10240
                                                     INTEGER(0..10239)
    sl-drx-SlotOffset-r17
                                             INTEGER (0..31)
-- TAG-SL-DRX-CONFIGUCSEMISTATIC-STOP
-- ASN1STOP
```

- SL-FreqConfig

The IE SL-FreqConfig specifies the dedicated configuration information on one particular carrier frequency for NR sidelink communication.

SL-FreqConfig information element

```
-- ASN1START
-- TAG-SL-FREOCONFIG-START
SL-FreqConfig-r16 ::=
    sl-Freq-Id-r16
                                       SL-Freq-Id-r16,
    sl-SCS-SpecificCarrierList-r16
                                       SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier,
    sl-AbsoluteFrequencyPointA-r16
                                      ARFCN-ValueNR
                                                                                                       OPTIONAL, -- Need M
    sl-AbsoluteFrequencySSB-r16
                                      ARFCN-ValueNR
                                                                                                       OPTIONAL, -- Need R
                                                                                                       OPTIONAL, -- Cond V2X-SL-Shared
    frequencyShift7p5khzSL-r16
                                      ENUMERATED {true}
    valueN-r16
                                      INTEGER (-1..1),
    sl-BWP-ToReleaseList-r16
                                       SEQUENCE (SIZE (1..maxNrofSL-BWPs-r16)) OF BWP-Id
                                                                                                       OPTIONAL, -- Need N
                                                                                                       OPTIONAL, -- Need N
    sl-BWP-ToAddModList-r16
                                       SEQUENCE (SIZE (1..maxNrofSL-BWPs-r16)) OF SL-BWP-Config-r16
                                                                                                       OPTIONAL, -- Need M
    sl-SyncConfigList-r16
                                       SL-SyncConfigList-r16
                                       ENUMERATED {gnss, gnbEnb}
                                                                                                       OPTIONAL -- Need M
    sl-SyncPriority-r16
SL-Freq-Id-r16 ::=
                                       INTEGER (1.. maxNrofFreqSL-r16)
-- TAG-SL-FREQCONFIG-STOP
-- ASN1STOP
```

SL-FreqConfig field descriptions

frequencyShift7p5khzSL

Enable the NR SL transmission with a 7.5 kHz shift to the LTE raster. If the field is absent, the frequency shift is disabled.

sl-AbsoluteFrequencyPointA

Absolute frequency of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A.

sl-AbsoluteFrequencySSB

Indicates the frequency location of sidelink SSB. The transmission bandwidth for sidelink SSB is within the bandwidth of this sidelink BWP.

sI-BWP-ToAddModList

This field indicates the list of sidelink BWP(s) on which the NR sidelink communication configuration is to be added or reconfigured. In this release, only one BWP is allowed to be configured for NR sidelink communication.

sI-BWP-ToReleaseList

This field indicates the list of sidelink BWP(s) on which the NR sidelink communication configuration is to be released.

sI-Freq-Id

This field indicates the identity of the dedicated configuration information on the carrier frequency for NR sidelink communication.

sI-SCS-SpecificCarrierList

A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. In this release, only one SCS-SpecificCarrier is allowed to be configured for NR sidelink communication.

sI-SyncPriority

This field indicates synchronization priority order, as specified in clause 5.8.6.

valueN

Indicate the NR SL transmission with a valueN *5kHz shift to the LTE raster. (see TS 38.101-1 [15], clause 5.4E.2).

Conditional Presence	Explanation
V2X-SL-Shared	This field is mandatory present if the carrier frequency configured for NR sidelink communication is shared by V2X sidelink
	communication. It is absent, Need R, otherwise.

SL-FregConfigCommon

The IE FreqConfigCommon specifies the cell-specific configuration information on one particular carrier frequency for NR sidelink communication.

SL-FreqConfigCommon information element

```
-- ASN1START
-- TAG-SL-FREOCONFIGCOMMON-START
SL-FregConfigCommon-r16 ::= SEOUENCE {
    sl-SCS-SpecificCarrierList-rl6 SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier,
    sl-AbsoluteFrequencyPointA-r16 ARFCN-ValueNR,
   sl-AbsoluteFrequencySSB-r16
                                   ARFCN-ValueNR
                                                                                                      OPTIONAL, -- Need R
    frequencyShift7p5khzSL-r16
                                   ENUMERATED {true}
                                                                                                      OPTIONAL, -- Cond V2X-SL-Shared
   valueN-r16
                                   INTEGER (-1..1),
    sl-BWP-List-r16
                                   SEQUENCE (SIZE (1..maxNrofSL-BWPs-r16)) OF SL-BWP-ConfigCommon-r16 OPTIONAL, -- Need R
    sl-SyncPriority-r16
                                   ENUMERATED {gnss, gnbEnb}
                                                                                                      OPTIONAL, -- Need R
   sl-NbAsSync-r16
                                    BOOLEAN
                                                                                                      OPTIONAL, -- Need R
```

OPTIONAL, -- Need M

OPTIONAL, -- Need M

```
sl-SyncConfigList-r16 SL-SyncConfigList-r16 ...
}
-- TAG-SL-FREQCONFIGCOMMON-STOP
-- ASN1STOP
```

OPTIONAL, -- Need R

SL-FreqConfigCommon field descriptions

frequencyShift7p5khzSL

Enable the NR SL transmission with a 7.5 kHz shift to the LTE raster. If the field is absent, the frequency shift is disabled.

sl-AbsoluteFrequencyPointA

Absolute frequency of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A.

sl-AbsoluteFrequencySSB

Indicates the frequency location of sidelink SSB. The transmission bandwidth for sidelink SSB is within the bandwidth of this sidelink BWP.

sI-BWP-List

This field indicates the list of sidelink BWP(s) on which the NR sidelink communication configuration. In this release, only one BWP is allowed to be configured for NR sidelink communication.

sI-NbAsSvnc

This field indicates whether the network can be selected as synchronization reference directly/indirectly only, if *sl-SyncPriority* is set to gnss. If this field is set to TRUE, the network is enabled to be selected as synchronization reference directly/indirectly. The field is only present in *SidelinkPreconfigNR*. Otherwise it is absent.

sI-SvncPriority

This field indicates synchronization priority order, as specified in clause 5.8.6..

sI-SyncConfigList

This field indicates the configuration by which the UE is allowed to receive and transmit synchronisation information for NR sidelink communication. Network configures sl-SyncConfig including txParameters when configuring UEs to transmit synchronisation information. If this field is configured in SL-PreconfigurationNR-r16, only one entry is configured in sl-SyncConfigList.

valueN

Indicate the NR SL transmission with a valueN *5kHz shift to the LTE raster (see TS 38.101-1 [15], clause 5.4E.2).

Conditional Presence	Explanation
V2X-SL-Shared	This field is mandatory present if the carrier frequency configured for NR sidelink communication is shared by V2X sidelink
	communication. It is absent, Need R, otherwise.

SL-InterUE-CoordinationConfig

The IE SL-InterUE-CoordinationConfig is used to configure the sidelink inter-UE coordination parameters.

SL-InterUE-CoordinationConfig information element

ETSI

```
-- ASN1START
-- TAG-SL-INTERUE-COORDINATIONCONFIG-START

SL-InterUE-CoordinationConfig-r17 ::= SEQUENCE {
    sl-InterUE-CoordinationScheme1-r17 SL-InterUE-CoordinationScheme2-r17 SL-InterUE-CoordinationScheme2-r17
```

```
SL-InterUE-CoordinationSchemel-r17 ::=
                                          SEOUENCE {
    sl-IUC-Explicit-r17
                                              ENUMERATED {enabled, disabled}
                                                                                                                    OPTIONAL.
                                                                                                                                -- Need M
    sl-IUC-Condition-r17
                                              ENUMERATED {enabled, disabled}
                                                                                                                                 -- Need M
                                                                                                                    OPTIONAL,
    sl-Condition1-A-2-r17
                                              ENUMERATED {disabled}
                                                                                                                    OPTIONAL.
                                                                                                                                -- Need M
    sl-ThresholdRSRP-Condition1-B-1-Option1List-r17 SEQUENCE (SIZE (1..8)) OF SL-ThresholdRSRP-Condition1-B-1-r17 OPTIONAL,
                                                                                                                                -- Need M
    sl-ThresholdRSRP-Condition1-B-1-Option2List-r17 SEQUENCE (SIZE (1..8)) OF SL-ThresholdRSRP-Condition1-B-1-r17 OPTIONAL,
                                                                                                                                -- Need M
    sl-ContainerCoordInfo-r17
                                              ENUMERATED {enabled, disabled}
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need M
    sl-ContainerRequest-r17
                                              ENUMERATED {enabled, disabled}
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need M
    sl-TriggerConditionCoordInfo-r17
                                                                                                                                -- Need M
                                              INTEGER (0..1)
                                                                                                                    OPTIONAL,
    sl-TriggerConditionRequest-r17
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need M
                                              INTEGER (0..1)
    sl-PriorityCoordInfoExplicit-r17
                                              INTEGER (1..8)
                                                                                                                    OPTIONAL.
                                                                                                                                -- Need M
    sl-PriorityCoordInfoCondition-r17
                                              INTEGER (1..8)
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need M
    sl-PriorityRequest-r17
                                              INTEGER (1..8)
                                                                                                                    OPTIONAL,
                                                                                                                               -- Need M
    sl-PriorityPreferredResourceSet-r17
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need M
                                              INTEGER (1..8)
    sl-MaxSlotOffsetTRIV-r17
                                              INTEGER (1..8000)
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need M
    sl-NumSubCH-PreferredResourceSet-r17
                                              INTEGER (1..27)
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need M
                                                                                                                                -- Need M
    sl-ReservedPeriodPreferredResourceSet-r17 INTEGER (1..16)
                                                                                                                    OPTIONAL,
    sl-DetermineResourceType-r17
                                              ENUMERATED {uea, ueb}
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need M
SL-InterUE-CoordinationScheme2-r17 ::=
                                          SEOUENCE {
    sl-IUC-Scheme2-r17
                                              ENUMERATED {enabled}
                                                                                                                    OPTIONAL.
                                                                                                                                -- Need R
                                                                                                                                -- Need M
    sl-RB-SetPSFCH-r17
                                              BIT STRING (SIZE (10..275))
                                                                                                                    OPTIONAL,
    sl-TypeUE-A-r17
                                              ENUMERATED {enabled}
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need R
                                              INTEGER (0..1)
    sl-PSFCH-Occasion-r17
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need M
    sl-SlotLevelResourceExclusion-r17
                                              ENUMERATED {enabled}
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need R
    sl-OptionForCondition2-A-1-r17
                                              INTEGER (0..1)
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need M
    sl-IndicationUE-B-r17
                                              ENUMERATED {enabled, disabled}
                                                                                                                    OPTIONAL,
                                                                                                                                -- Need M
    . . . ,
    ] ]
    sl-DeltaRSRP-Thresh-v1720
                                              INTEGER (-30..30)
                                                                                                                    OPTIONAL
                                                                                                                                -- Need M
    11
SL-ThresholdRSRP-Condition1-B-1-r17 ::=
                                          SEQUENCE
    sl-Priority-r17
                                              INTEGER (1..8),
    sl-ThresholdRSRP-Condition1-B-1-r17
                                              INTEGER (0..66)
-- TAG-SL-INTERUE-COORDINATIONCONFIG-STOP
-- ASN1STOP
```

SL-InterUE-CoordinationScheme1 field descriptions

sl-Condition1-A-2

Indicates disabling the use of condition of excluding from preferred resource set resource(s) in slot(s) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B due to half duplex operation.

sl-ContainerCoordInfo

Indicates whether a SCI format 2-C can be used as the container of inter-UE coordination information transmission from UE-A to UE-B in Scheme 1 in addition to using MAC CF

sI-ContainerRequest

Indicates whether a SCI format 2-C can be used as the container of an explicit request for inter-UE coordination information transmission from UE-B to UE-A in Scheme 1 in addition to using MAC CE.

sI-DetermineResourceType

Indicates how to determine the resource set type to be provided by inter-UE coordination information transmission. Value "uea" means the resource set type is determined by UE-A's implementation. Value "ueb" means the resource set type is determined by UE-B's request.

sI-IUC-Condition

Indicates whether inter-UE coordination information triggered by a condition is enabled or not other than explicit request reception.

sl-IUC-Explicit

Indicates whether inter-UE coordination information triggered by an explicit request is enabled or not.

sI-MaxSlotOffsetTRIV

Indicates the maximum value of logical slot offset with respect to a reference slot that is used for representing the first resource location of each TRIV to indicate the set of resources in Scheme 1 as specified in TS 38.214 [19].

sl-NumSubCH-PreferredResousrceSet

Indicates the number of sub-channels used for determining the preferred resource set in Scheme 1 when the inter-UE coordination information transmission is triggered by a condition other than explicit request reception.

sI-PriorityCoordInfoCondition

Parameter used to determine the priority values for the purpose defined in TS 38.213 [13] and TS 38.214 [19] including, the priority value for sensing and candidate resource (re-)selection for transmitting the TB carrying the IUC MAC CE and the priority value in the SCI Format 1-A corresponding to the TB carrying the IUC MAC CE, triggered by a condition other than explicit request reception in Scheme 1. The priority value of IUC MAC CE used in LCP procedure (see TS 38.321 [3]) is fixed as "1".

sI-PriorityCoordInfoExplicit

Parameter used to determine the priority values for the purpose defined in TS 38.213 [13] and TS 38.214 [19] including, the priority value for sensing and candidate resource (re-)selection for transmitting the TB carrying the IUC MAC CE and the priority value in the SCI Format 1-A corresponding to the TB carrying the IUC MAC CE, triggered by an explicit request in Scheme 1. The priority value of IUC MAC CE used in LCP procedure (see TS 38.321 [3]) is fixed as "1".

sI-PriorityPreferredResourceSet

Indicates the priority value used for determining the preferred resource set in Scheme 1 when the inter-UE coordination information transmission is triggered by a condition other than explicit request reception.

sI-PriorityRequest

Parameter used to determine the priority values for the purpose defined in TS 38.213 [13] and TS 38.214 [19] including, the priority value for sensing and candidate resource (re-)selection for transmitting the TB carrying the IUC request MAC CE and the priority value in the SCI Format 1-A corresponding to the TB carrying the IUC request MAC CE, in an explicit request for inter-UE coordination information in Scheme 1. The priority value of IUC request MAC CE used in LCP procedure (see TS 38.321 [3]) is fixed as "1".

sI-ReservedPeriodPreferredResourceSet

Indicates the resource reservation interval used for determining the preferred resource set in Scheme 1 when the inter-UE coordination information transmission is triggered by a condition, by means of an index to the corresponding entry of sl-ResourceReservePeriodList-r16.

sl-TriagerConditionCoordInfo

Indicates the additional alternative trigger condition of inter-UE coordination information triggered by a condition rather than request reception in Scheme-1 from UE-A to UE-B. Value 0 means inter-UE coordination information is triggered by UE-A's implementation. Value 1 means inter-UE coordination information can be triggered only when UE-A has data to be transmitted together with the inter-UE coordination information to UE-B.

sl-TriggerConditionRequest

Indicates the trigger condition of an explicit request from UE-B to UE-A. Value 0 means the explicit request is triggered by UE-B's implementation. Value 1 means the explicit request can be triggered only when UE-B has data to be transmitted to UE-A.

sI-ThresholdRSRP-Condition1-B-1-Option1List

Indicates the RSRP threshold used to determine reserved resource(s) of other UE(s) whose RSRP measurement is larger than it as the set of resource(s) non-preferred for UE-B's transmission for Condition 1-B-1 of Scheme 1, as specified in TS 38.214 [19]. Value 0 corresponds to minus infinity dBm, value 1 corresponds to -128dBm, value 2 corresponds to -126dBm, value n corresponds to (-128 + (n-1)*2) dBm and so on, value 66 corresponds to infinity dBm.

sl-ThresholdRSRP-Condition1-B-1-Option2List

Indicates the RSRP threshold used to determine reserved resource(s) of other UE(s) whose RSRP measurement is smaller than it as the set of resource(s) non-preferred for UE-B's transmission for Condition 1-B-1 of Scheme 1, as specified in TS 38.214 [19]. Value 0 corresponds to minus infinity dBm, value 1 corresponds to -128dBm, value 2 corresponds to -126dBm, value n corresponds to (-128 + (n-1)*2) dBm and so on, value 66 corresponds to infinity dBm.

SL-InterUE-CoordinationScheme2 field descriptions

sI-DeltaRSRP-Thresh

Indicates the RSRP threshold delta value corresponding to *deltaRSRPThresh* specified in clause 16.3.0 of TS 38.213 [13] and used to determine reserved resource(s) of other UE(s). Value in dB. Only even values (step size 2) allowed.

sl-IndicationUE-B

Indicates whether to enable or disable the usage of 1 LSB of reserved bits of a SCI format 1-A to indicate of whether UE scheduling a conflict TB can be UE-B or not.

sI-IUC-Scheme2

Indicates whether inter-UE coordination Scheme 2 is enabled or not.

sI-OptionForCondition2-A-1

Indicates the RSRP threshold used to consider additional criteria for condition 2-A-1. Value 0 corresponds to using the RSRP threshold according to the priorities included in the SCI, UE uses thresholds *sl-Thres-RSRP-List*, in its resource pool configuration *sl-UE-SelectedConfigRP*, corresponding to *ThresPSSCH-RSRP-List* specified in clause 16.3.0 of TS 38.213 [13]. Value 1 corresponds to using a (pre)configured RSRP threshold delta value *sl-DeltaRSRP-Thresh*, corresponding to *deltaRSRPThresh* specified in clause 16.3.0 of TS 38.213 [13].

sI-PSFCH-Occasion

Indicates the reference slot from which a PSFCH occasion for inter-UE coordination information transmission is derived. Value 0 corresponds to the slot where UE-B's SCI is transmitted and value 1 corresponds to the slot where expected/potential resource conflict occurs on PSSCH resource indicated by UE-B's SCI.

sI-RB-SetPSFCH

Indicates the set of PRBs that are actually used for inter-UE coordination information transmission and reception in Scheme 2. The leftmost bit of the bitmap refers to the lowest RB index in the resource pool, and so on.

sl-SlotLevelResourceExclusion

Indicates that physical layer of UE-B reports resources in a slot including the next reserved resource indicated by the corresponding UE-B's SCI for current TB transmission to higher layer.

sI-TypeUE-A

Indicates that a non-destination UE of a TB transmitted by UE-B can be UE-A which sends inter-UE coordination information to UE-B, when UE-A is a destination UE of another TB conflicting with the TB transmitted by UE-B.

SL-LogicalChannelConfig

The IE SL-LogicalChannelConfig is used to configure the sidelink logical channel parameters.

SL-LogicalChannelConfig information element

```
-- ASN1START
-- TAG-SL-LOGICALCHANNELCONFIG-START
                                          SEQUENCE {
SL-LogicalChannelConfig-r16 ::=
    sl-Priority-r16
                                              INTEGER (1..8),
    sl-PrioritisedBitRate-r16
                                              ENUMERATED {kBps0, kBps8, kBps16, kBps32, kBps64, kBps128, kBps256, kBps512,
                                              kBps1024, kBps2048, kBps4096, kBps8192, kBps16384, kBps32768, kBps65536, infinity},
    sl-BucketSizeDuration-r16
                                              ENUMERATED {ms5, ms10, ms20, ms50, ms100, ms150, ms300, ms500, ms1000,
                                              spare7, spare6, spare5, spare4, spare3, spare2, spare1},
    sl-ConfiguredGrantType1Allowed-r16
                                              ENUMERATED {true}
                                                                                                                       OPTIONAL,
                                                                                                                                  -- Need R
    sl-HARO-FeedbackEnabled-r16
                                              ENUMERATED {enabled, disabled }
                                                                                                                       OPTIONAL, -- Need R
    sl-AllowedCG-List-r16
                                              SEQUENCE (SIZE (0.. maxNrofCG-SL-1-r16)) OF SL-ConfigIndexCG-r16
                                                                                                                       OPTIONAL,
                                                                                                                                  -- Need R
    sl-AllowedSCS-List-r16
                                              SEQUENCE (SIZE (1..maxSCSs)) OF SubcarrierSpacing
                                                                                                                       OPTIONAL,
                                                                                                                                  -- Need R
                                              ENUMERATED {ms0p02, ms0p04, ms0p0625, ms0p125, ms0p25, ms0p5, spare2, spare1}
    sl-MaxPUSCH-Duration-r16
                                                                                                                       OPTIONAL, -- Need R
    sl-LogicalChannelGroup-r16
                                              INTEGER (0..maxLCG-ID)
                                                                                                                       OPTIONAL, -- Need R
    sl-SchedulingRequestId-r16
                                                                                                                       OPTIONAL, -- Need R
                                              SchedulingRequestId
    sl-LogicalChannelSR-DelayTimerApplied-r16 BOOLEAN
                                                                                                                       OPTIONAL, -- Need R
-- TAG-SL-LOGICALCHANNELCONFIG-STOP
-- ASN1STOP
```

SL-LogicalChannelConfig field descriptions

sI-AllowedCG-List

This restriction applies only when the SL grant is a configured grant. If present, SL MAC SDUs from this logical channel can only be mapped to the indicated configured grant configuration. If the size of the sequence is zero, then SL MAC SDUs from this logical channel cannot be mapped to any configured grant configurations. If the field is not present, SL MAC SDUs from this logical channel can be mapped to any configured grant configurations. If the field *sl-ConfiguredGrantType1Allowed* is present, only those sidelink configured grant type 1 configurations indicated in this sequence are allowed for use by this sidelink logical channel; otherwise, this sequence shall not include any sidelink configured grant type 1 configuration. Corresponds to "sl-AllowedCG-List" as specified in TS 38.321 [3].

sl-AllowedSCS-List

If present, indicate the numerology of UL-SCH resources that this sidelink logical channel is mapped to, when checking the SR trigger condition. Corresponds to 'sl-AllowedSCS-List' in TS 38.321 [3].

sl-BucketSizeDuration

Value in ms. ms5 corresponds to 5 ms, value ms10 corresponds to 10 ms, and so on.

sl-ConfiguredGrantType1Allowed

If present and set to true, or if the capability *Icp-RestrictionSidelink* as specified in TS 38.306 [26] is not indicated, SL MAC SDUs from this sidelink logical channel can be transmitted on a sidelink configured grant type 1. Otherwise, SL MAC SDUs from this logical channel cannot be transmitted on a sidelink configured grant type 1. Corresponds to 'sl-configuredGrantType1Allowed' in TS 38.321 [3].

sl-HARQ-FeedbackEnabled

Network always includes this field. It indicates the HARQ feedback enabled/disabled restriction in LCP for this sidelink logical channel. If set to *enabled*, the sidelink logical channel will be multiplexed only with a logical channel which enabling the HARQ feedback. If set to *disabled*, the sidelink logical channel cannot be multiplexed with a logical channel which enabling the HARQ feedback. Corresponds to 'sl-HARQ-FeedbackEnabled' in TS 38.321 [3]. If this field of at least one sidelink logical channel for the UE is set to enabled, *sl-PSFCH-Config* should be mandatory present in configuration *SL-ResourcePool* of at least one of the sidelink resource pools.

sl-LogicalChannelGroup

ID of the sidelink logical channel group, as specified in TS 38.321 [3], which the sidelink logical channel belongs to.

sl-LogicalChannelSR-DelayTimerApplied

Indicates whether to apply the delay timer for SR transmission for this sidelink logical channel. Set to false if logicalChannelSR-DelayTimer is not included in sI-BSR-Config.

sI-MaxPUSCH-Duration

If present, indicate the maximum PUSCH duration of UL-SCH resources that this sidelink logical channel is mapped to, when checking the SR trigger condition. Corresponds to "sl-MaxPUSCH-Duration" in TS 38.321 [3].

sl-PrioritisedBitRate

Value in kiloBytes/s. Value kBps0 corresponds to 0 kiloBytes/s, value kBps8 corresponds to 8 kiloBytes/s, value kBps16 corresponds to 16 kiloBytes/s, and so on.

sl-Priority

Sidelink logical channel priority, as specified in TS 38.321 [3].

sl-SchedulingRequestId

If present, it indicates the scheduling request configuration applicable for this sidelink logical channel, as specified in TS 38.321 [3].

SL-L2RelayUE-Config

The IE SL-L2RelayUE-Config is used to configure L2 U2N relay operation related configurations used by L2 U2N Relay UE, e.g. SRAP-Config.

SL-L2RelayUE-Config information element

```
-- ASN1START
-- TAG-SL-L2RELAYUE-CONFIG-START

SL-L2RelayUE-Config-r17 ::= SEQUENCE {
    sl-RemoteUE-ToAddModList-r17 SEQUENCE (SIZE (1..maxNrofRemoteUE-r17)) OF SL-RemoteUE-ToAddMod-r17 OPTIONAL, -- Need N
```

SL-L2RelayUE-Config field descriptions

sI-RemoteUE-ToAddModList

List of L2 U2N Remote UEs to be added and modified to the L2 U2N Relay UE.

sl-RemoteUE-ToReleaseList

List of L2 U2N Remote UEs to be released by the L2 U2N Relay UE.

SL-L2RemoteUE-Config

The IE SL-L2Remote UE-Config is used to configure L2 U2N relay operation related configurations used by L2 U2N Remote UE, e.g. SRAP-Config.

SL-L2RemoteUE-Config information element

```
-- ASN1START
-- TAG-SL-L2REMOTEUE-CONFIG-START

SL-L2RemoteUE-Config-r17 ::= SEQUENCE {
    sl-SRAP-ConfigRemote-r17 SL-SRAP-Config-r17 OPTIONAL, --Need M
    sl-UEIdentityRemote-r17 RNTI-Value OPTIONAL, -- Cond FirstRRCReconfig
    ...
}
-- TAG-SL-L2REMOTEUE-CONFIG-STOP
-- ASN1STOP
```

SL-L2RemoteUE-Config field descriptions

sI-SRAP-ConfigRemote

Indicates SRAP configuration used for L2 U2N Remote UE.

sI-UEldentityRemote

Indicates the C-RNTI to the L2 U2N Remote UE.

Conditional Presence	Explanation
FirstRRCReconfig	This field is mandatory present in the first RRCReconfiguration. Otherwise the field is absent.

SL-MeasConfigCommon

The IE SL-MeasConfigCommon is used to set the cell specific SL RSRP measurement configurations for unicast destinations.

SL-MeasConfigCommon information element

SL-MeasConfigCommon field descriptions

sl-MeasIdListCommon

List of sidelink measurement identities

sl-MeasObjectListCommon

List of sidelink measurement objects.

sI-QuantityConfigCommon

Indicates the layer 3 filtering coefficient for sidelink measurement.

sl-ReportConfigListCommon

List of sidelink measurement reporting configurations.

SL-MeasConfigInfo

The IE SL-MeasConfigInfo is used to set RSRP measurement configurations for unicast destinations.

SL-MeasConfigInfo information element

```
-- ASN1START
-- TAG-SL-MEASCONFIGINFO-START

SL-MeasConfigInfo-r16 ::= SEQUENCE {
    sl-DestinationIndex-r16 SL-DestinationIndex-r16,
    sl-MeasConfig-r16 SL-MeasConfig-r16,
    ...
}

SL-MeasConfig-r16 ::= SEQUENCE {
    sl-MeasObjectToRemoveList-r16 SL-MeasObjectToRemoveList-r16 OPTIONAL, -- Need N
```

```
sl-MeasObjectToAddModList-r16
                                       SL-MeasObjectList-r16
                                                                                                              OPTIONAL,
                                                                                                                         -- Need N
    sl-ReportConfigToRemoveList-r16
                                       SL-ReportConfigToRemoveList-r16
                                                                                                              OPTIONAL. -- Need N
    sl-ReportConfigToAddModList-r16
                                       SL-ReportConfigList-r16
                                                                                                              OPTIONAL. -- Need N
    sl-MeasIdToRemoveList-r16
                                       SL-MeasIdToRemoveList-r16
                                                                                                              OPTIONAL, -- Need N
    sl-MeasIdToAddModList-r16
                                       SL-MeasIdList-r16
                                                                                                              OPTIONAL. -- Need N
    sl-OuantityConfig-r16
                                       SL-OuantityConfig-r16
                                                                                                              OPTIONAL, -- Need M
    . . .
SL-MeasObjectToRemoveList-r16 ::= SEQUENCE (SIZE (1..maxNrofSL-ObjectId-r16)) OF SL-MeasObjectId-r16
SL-ReportConfigToRemoveList-r16 ::= SEQUENCE (SIZE (1..maxNrofSL-ReportConfigId-r16)) OF SL-ReportConfigId-r16
SL-MeasIdToRemoveList-r16 ::=
                                   SEOUENCE (SIZE (1..maxNrofSL-MeasId-r16)) OF SL-MeasId-r16
-- TAG-SL-MEASCONFIGINFO-STOP
-- ASN1STOP
```

SL-MeasConfigInfo field descriptions

sI-MeasIdToAddModList

List of sidelink measurement identities to add and/or modify.

sl-MeasIdToRemoveList

List of sidelink measurement identities to remove.

sl-MeasObjectToAddModList

List of sidelink measurement objects to add and/or modify.

sl-MeasObiectToRemoveList

List of sidelink measurement objects to remove.

sI-QuantityConfig

Indicates the layer 3 filtering coefficient for sidelink measurement.

sl-ReportConfigToAddModList

List of sidelink measurement reporting configurations to add and/or modify.

sI-ReportConfigToRemoveList

List of sidelink measurement reporting configurations to remove.

- SL-MeasIdList

The IE SL-MeasIdList concerns a list of SL measurement identities to add or modify for a destination, with for each entry the sl-MeasId, the associated sl-MeasObjectId and the associated sl-ReportConfigId.

SL-MeasIdList information element

```
-- ASN1START
-- TAG-SL-MEASIDLIST-START

SL-MeasIdList-r16 ::= SEQUENCE (SIZE (1..maxNrofSL-MeasId-r16)) OF SL-MeasIdInfo-r16

SL-MeasIdInfo-r16 ::= SEOUENCE {
```

```
sl-MeasId-r16
sl-MeasObjectId-r16
sl-MeasObjectId-r16
sl-ReportConfigId-r16
...
}

SL-MeasId-r16,
SL-MeasObjectId-r16,
SL-ReportConfigId-r16,
...
}

SL-MeasId-r16 ::= INTEGER (1..maxNrofSL-MeasId-r16)
-- TAG-SL-MEASIDLIST-STOP
-- ASNISTOP
```

SL-MeasObjectList

The IE SL-MeasObjectList concerns a list of SL measurement objects to add or modify for a destination.

SL-MeasObjectList information element

```
-- ASN1START
-- TAG-SL-MEASOBJECTLIST-START
SL-MeasObjectList-r16 ::=
                                        SEQUENCE (SIZE (1..maxNrofSL-ObjectId-r16)) OF SL-MeasObjectInfo-r16
SL-MeasObjectInfo-r16 ::=
                                        SEQUENCE {
                                            SL-MeasObjectId-r16,
    sl-MeasObjectId-r16
    sl-MeasObject-r16
                                            SL-MeasObject-r16,
SL-MeasObjectId-r16 ::=
                                        INTEGER (1..maxNrofSL-ObjectId-r16)
SL-MeasObject-r16 ::=
                                        SEOUENCE {
                                            ARFCN-ValueNR,
    frequencyInfoSL-r16
-- TAG-SL-MEASOBJECTLIST-STOP
-- ASN1STOP
```

SL-MeasObjectList field descriptions

sl-MeasObjectId

It is used to identify a sidelink measurement object configuration.

sl-MeasObject

It specifies information applicable for sidelink DMRS measurement.

SL-PagingIdentityRemoteUE

The IE SL-PagingIdentityRemoteUE includes the Remote UE's paging UE ID.

SL-PagingIdentityRemoteUE information element

SL-PBPS-CPS-Config

The IE *SL-PBPS-CPS-Config* specifies the operation information for a resource pool which can be (pre-)configured to enable full sensing only, partial sensing only, random resource selection only, or any combination(s) thereof.

SL-PBPS-CPS-Config information element

```
-- ASN1START
-- TAG-SL-PBPS-CPS-CONFIG-START
SL-PBPS-CPS-Config-r17 ::=
sl-AllowedResourceSelectionConfig-r17
                                          ENUMERATED {c1, c2, c3, c4, c5, c6, c7}
                                                                                                              OPTIONAL,
                                                                                                                         -- Need M
sl-MinNumCandidateSlotsPeriodic-r17
                                          INTEGER (1..32)
                                                                                                                          -- Need M
                                                                                                              OPTIONAL,
sl-PBPS-OccasionReservePeriodList-r17
                                          SEQUENCE (SIZE (1..16)) OF INTEGER (1..16)
                                                                                                              OPTIONAL,
                                                                                                                         -- Need M
sl-Additional-PBPS-Occasion-r17
                                          ENUMERATED { monitored }
                                                                                                              OPTIONAL, -- Need M
sl-CPS-WindowPeriodic-r17
                                          INTEGER (5..30)
                                                                                                              OPTIONAL,
                                                                                                                         -- Need M
sl-MinNumCandidateSlotsAperiodic-r17
                                         INTEGER (1..32)
                                                                                                              OPTIONAL,
                                                                                                                         -- Need M
sl-MinNumRssiMeasurementSlots-r17
                                         INTEGER (1..800)
                                                                                                              OPTIONAL,
                                                                                                                         -- Need M
sl-DefaultCBR-RandomSelection-r17
sl-DefaultCBR-PartialSensing-r17
                                                                                                                         -- Need M
                                         INTEGER (0..100)
                                                                                                              OPTIONAL,
                                                                                                                         -- Need M
                                         INTEGER (0..100)
                                                                                                              OPTIONAL.
sl-CPS-WindowAperiodic-r17
                                         INTEGER (0..30)
                                                                                                              OPTIONAL, -- Need M
sl-PartialSensingInactiveTime-r17
                                         ENUMERATED { enabled, disabled }
                                                                                                              OPTIONAL, -- Need M
-- TAG-SL-PBPS-CPS-CONFIG-STOP
-- ASN1STOP
```

SL-PBPS-CPS-Config field descriptions

sl-Additional-PBPS-Occasion

Indicates that UE additionally monitors periodic sensing occasions that correspond to a set of values. (see TS 38.214 [19], clause 8.1.4).

sI-AllowedResourceSelectionConfig

Indicates the allowed resource selection mechanism(s), i.e. full sensing only, partial sensing only, random resource selection only, or any combination(s) thereof. (see TS 38.214 [19], clause 8.1.4). Only c1, c4, c5 or c7 can be configured for a Rel-16 resource pool. If this field is not configured for a resource pool included in *sl-TxPoolSelectedNormal*, only full sensing is allowed in the corresponding resource pool.

- c1: only full sensing allowed
- c2: only partial sensing allowed
- c3: only random selection allowed
- c4: full sensing+random selection allowed
- c5: full sensing+ partial sensing allowed
- c6: partial sensing + random selection allowed
- c7: full sensing+ partial sensing + random selection allowed.

sI-CPS-WindowAperiodic

Parameter that indicates the minimum size of contiguous partial sensing window in logical slot units for a resource (re)selection procedure and re-evaluation/pre-emption checking triggered by aperiodic transmission. (see TS 38.214 [19], clause 8.1.4). If not configured, the size of contiguous partial sensing window in logical slot units is 31.

sI-CPS-WindowPeriodic

Indicates the size of contiguous partial sensing window in logical slot units when UE performs periodic-based and contiguous partial sensing for a resource (re)selection procedure triggered by periodic transmission. If not configured, the size of contiguous partial sensing window in logical slot units is 31.

sI-DefaultCBR-PartialSensing

Indicates default value of SL CBR measurement for a UE that is configured to perform partial sensing by its higher layer (including when SL DRX is configured) if the number of SL RSSI measurement slots over CBR measurement window is below *sl-MinNumRssiMeasurementSlots*, (see TS 38.214 [19], clause 8.1.6). Value 0 corresponds to 0, value 1 to 0.01, value 2 to 0.02, and so on.

sl-DefaultCBR-RandomSelection

Indicates default value of CBR measurement for a UE that performs random resource selection if no SL CBR measurement result over SL CBR measurement window, (see TS 38.214 [19], clause 8.1.6). Value 0 corresponds to 0, value 1 to 0.01, value 2 to 0.02, and so on.

sI-MinNumCandidateSlotsAperiodic

Indicates the minimum number of Y' slots that are included in the possible candidate resources corresponding to periodic-based partial sensing and/or contiguous partial sensing for resource (re)selection triggered by aperiodic transmission. (see TS 38.214 [19], clause 8.1.4).

sl-MinNumCandidateSlotsPeriodic

Indicates the minimum number of Y slots that are included in the possible candidate resources corresponding to periodic-based partial sensing for resource (re)selection triggered by periodic transmission. (see TS 38.214 [19], clause 8.1.4).

sl-MinNumRssiMeasurementSlots

Indicates a threshold for a minimum number of SL RSSI measurement slots over CBR measurement window for which the SL RSSI is measured for a UE that is configured to perform partial sensing by its higher layer (including when SL DRX is configured). (see TS 38.214 [19], clause 8.1.6).

sI-PartialSensingInactiveTime

Indicates whether or not UE is required to perform SL reception of PSCCH and RSRP measurement for partial sensing on slots in SL DRX inactive time when partial sensing is configured by its higher layer. (see TS 38.214 [19], clause 8.1.4).

sI-PBPS-OccasionReservePeriodList

Indicates the subset of periodicity values from *sl-ResourceReservePeriodList* used to determine periodic sensing occasions in periodic-based partial sensing, by means of an index to the corresponding entry in *sl-ResourceReservePeriodList-r16*. If not configured, all periodicity values from *sl-ResourceReservePeriodList* are used to determine periodic sensing occasions in periodic-based partial sensing (see TS 38.214 [19], clause 8.1.4).

SL-PDCP-Config

The IE SL-PDCP-Config is used to set the configurable PDCP parameters for a sidelink radio bearer.

SL-PDCP-Config information element

SL-PDCP-Config field descriptions

sl-DiscardTimer

Value in ms of discardTimer specified in TS 38.323 [5]. Value ms50 corresponds to 50 ms, value ms100 corresponds to 100 ms and so on.

sl-OutOfOrderDelivery

Indicates whether or not outOfOrderDelivery specified in TS 38.323 [5] is configured. This field should be either always present or always absent, after the radio bearer is established.

sI-PDCP-SN-Size

PDCP sequence number size for unicast NR sidelink communication, 12 or 18 bits, as specified in TS 38.323 [5]. For groupcast and broadcast NR sidelink communication, only 12 bits is applicable, as specified in 9.1.1.5.

Conditional Presence	Explanation
Setup	The field is mandatory present in case of sidelink DRB setup via dedicated signaling and in case of sidelink DRB configuration
	via system information and pre-configuration; otherwise the field is optionally present, need M.
Setup2	The field is mandatory present in case of sidelink DRB setup via dedicated signaling and in case of sidelink DRB configuration
	via system information and pre-configuration for RLC-AM and RLC-UM for unicast NR sidelink communication; otherwise the
	field is not present, Need M.

SL-PSBCH-Config

The IE SL-PSBCH-Config indicates PSBCH transmission parameters on each sidelink bandwidth part.

SL-PSBCH-Config information element

```
-- TAG-SL-PSBCH-CONFIG-START
SL-PSBCH-Config-r16 ::= SEQUENCE {
   dl-P0-PSBCH-r16 INTEGER (-16..15)
                                                                                                              OPTIONAL,
                                                                                                                           -- Need M
    dl-Alpha-PSBCH-r16
                           ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}
                                                                                                              OPTIONAL.
                                                                                                                           -- Need M
    [ [
    dl-P0-PSBCH-r17
                           INTEGER (-202..24)
                                                                                                              OPTIONAL
                                                                                                                           -- Need M
    11
-- TAG-SL-PSBCH-CONFIG-STOP
-- ASN1STOP
```

SL-PSBCH-Config field descriptions

dl-Alpha-PSBCH

Indicates alpha value for DL pathloss based power control for PSBCH. When the field is not configured the UE applies the value 1.

dI-P0-PSBCH

Indicates P0 value for DL pathloss based power control for PSBCH. If not configured, DL pathloss based power control is disabled for PSBCH. When *dl-P0-PSBCH-r17* is configured, the UE ignores *dl-P0-PSBCH-r16*.

SL-PSSCH-TxConfigList

The IE *SL-PSSCH-TxConfigList* indicates PSSCH transmission parameters. When lower layers select parameters from the range indicated in IE *SL-PSSCH-TxConfigList*, the UE considers both configurations in IE *SL-PSSCH-TxConfigList* and the CBR-dependent configurations represented in IE *SL-CBR-PriorityTxConfigList*. Only one IE *SL-PSSCH-TxConfig* is provided per *SL-TypeTxSync*.

SL-PSSCH-TxConfigList information element

```
-- ASN1START
-- TAG-SL-PSSCH-TXCONFIGLIST-START
SL-PSSCH-TxConfigList-r16 ::=
                                SEQUENCE (SIZE (1..maxPSSCH-TxConfig-r16)) OF SL-PSSCH-TxConfig-r16
SL-PSSCH-TxConfig-r16 ::=
                                 SEQUENCE {
    sl-TypeTxSync-r16
                                     SL-TypeTxSync-r16
                                                                                         OPTIONAL,
                                                                                                      -- Need R
    sl-ThresUE-Speed-r16
                                    ENUMERATED {kmph60, kmph80, kmph100, kmph120,
                                                kmph140, kmph160, kmph180, kmph200},
    sl-ParametersAboveThres-r16
                                    SL-PSSCH-TxParameters-r16,
    sl-ParametersBelowThres-r16
                                    SL-PSSCH-TxParameters-r16,
    sl-ParametersAboveThres-v1650
                                    SL-MinMaxMCS-List-r16
                                                                                         OPTIONAL,
                                                                                                      -- Need R
                                                                                         OPTIONAL
    sl-ParametersBelowThres-v1650
                                    SL-MinMaxMCS-List-r16
                                                                                                      -- Need R
```

SL-PSSCH-TxConfigList field descriptions

sl-MaxTxTransNumPSSCH

Indicates the maximum transmission number (including new transmission and retransmission) for PSSCH.

sI-MaxTxPower

-- ASN1STOP

This field indicates the maximum transmission power for transmission on PSSCH and PSCCH.

sI-MinMCS-PSSCH, sI-MaxMCS-PSSCH

This field indicates the minimum and maximum MCS values used for transmissions on PSSCH. The UE shall ignore the minimum and maximum MCS values used for the associated MCS table(s) in sl-ParametersAboveThres-r16 and sl-ParametersBelowThres-r16 if sl-ParametersAboveThres-v1650 and sl-ParametersBelowThres-v1650 are present, respectively.

sl-MinSubChannelNumPSSCH, sl-MaxSubChannelNumPSSCH

This field indicates the minimum and maximum number of sub-channels which may be used for transmissions on PSSCH.

sI-TypeTxSync

This field indicates the synchronization reference type. For configurations by the eNB/gNB, only *gnbEnb* can be configured; and for pre-configuration or when this field is absent, the configuration is applicable for all synchronization reference types.

sI-ThresUE-Speed

This field indicates a UE absolute speed threshold.

Conditional Presence	Explanation
CBR	The field is optionally present, Need R, when the IE SL-PSSCH-TxParameters is present in SL-CBR-CommonTxConfigList,
	SL-UE-SelectedConfig, SIB12 or SidelinkPreconfigNR; otherwise the field is not present, need R.

SL-QoS-FlowIdentity

The IE SL-QoS-FlowIdentity is used to identify a sidelink QoS flow.

SL-QoS-FlowIdentity information element

```
-- ASN1START
-- TAG-SL-QOS-FLOWIDENTITY-START

SL-QOS-FlowIdentity-r16 ::= INTEGER (1..maxNrofSL-QFIs-r16)

-- TAG-SL-QOS-FLOWIDENTITY-STOP
```

-- ASN1STOP

SL-QoS-Profile

The IE *SL-QoS-Profile* is used to give the QoS parameters for a sidelink QoS flow. Need codes or conditions specified for *SL-QoS-Profile* do not apply, in case *SL-QoS-Profile* is included in *SidelinkUEInformationNR*.

SL-QoS-Profile information element

```
-- ASN1START
-- TAG-SL-QOS-PROFILE-START
SL-OoS-Profile-r16 ::=
                            SEQUENCE {
   sl-POI-r16
                                SL-POI-r16
                                                                                          OPTIONAL,
                                                                                                    -- Need R
   sl-GFBR-r16
                                INTEGER (0..4000000000)
                                                                                          OPTIONAL, -- Need R
   sl-MFBR-r16
                               INTEGER (0..4000000000)
                                                                                          OPTIONAL, -- Need R
   sl-Range-r16
                                INTEGER (1..1000)
                                                                                          OPTIONAL.
                                                                                                    -- Need R
SL-PQI-r16 ::=
                            CHOICE {
   sl-StandardizedPQI-r16 INTEGER (0..255),
   sl-ResourceType-r16
sl-PriorityLevel-r16
                                   ENUMERATED {gbr, non-GBR, delayCriticalGBR, spare1}
                                                                                          OPTIONAL,
                                                                                                     -- Need R
                                    INTEGER (1..8)
                                                                                          OPTIONAL,
                                                                                                     -- Need R
       sl-PacketDelayBudget-r16 INTEGER (0..1023)
                                                                                          OPTIONAL, -- Need R
       sl-PacketErrorRate-r16 INTEGER (0..9)
sl-AveragingWindow-r16 INTEGER (0..4095)
                                                                                          OPTIONAL, -- Need R
                                                                                          OPTIONAL, -- Need R
       sl-MaxDataBurstVolume-r16 INTEGER (0..4095)
                                                                                          OPTIONAL, -- Need R
-- TAG-SL-QOS-PROFILE-STOP
-- ASN1STOP
```

SL-QoS-Profile field descriptions

sI-GFBR

Indicate the guaranteed bit rate for a GBR QoS flow. The unit is: Kbit/s

sI-MFBR

Indicate the maximum bit rate for a GBR QoS flow. The unit is: Kbit/s

sI-PQI

This field indicates either the PQI for standardized PQI or non-standardized QoS parameters.

sI-Range

This field indicates the range parameter of the Qos flow, as defined in clause 5.4.1.1.1, TS 23.287 [55]. It is present only for groupcast. The unit is meter.

SL-PQI field descriptions

sl-AveragingWindow

Indicates the Averaging Window for a QoS flow, and applies to GBR QoS flows only. Unit: ms. The default value of the IE is 2000ms.

sl-MaxDataBurstVolume

Indicates the Maximum Data Burst Volume for a QoS flow, and applies to delay critical GBR QoS flows only. Unit: byte.

sl-PacketDelayBudget

Indicates the Packet Delay Budget for a QoS flow. Upper bound value for the delay that a packet may experience expressed in unit of 0.5ms.

sl-PacketErrorRate

Indicates the Packet Error Rate for a QoS flow. The packet error rate is expressed as Scalar x 10-k where k is the Exponent.

sl-PriorityLevel

Indicates the Priority Level for a QoS flow. Values ordered in decreasing order of priority, i.e. with 1 as the highest priority and 8 as the lowest priority.

sl-StandardizedPQI

Indicate the PQI for standardized PQI.

SL-QuantityConfig

The IE SL-QuantityConfig specifies the layer 3 filtering coefficients for NR SL RSRP measurement for a destination.

SL-QuantityConfig information element

```
-- ASN1START
-- TAG-SL-QUANTITYCONFIG-START

SL-QuantityConfig-r16 ::= SEQUENCE {
    sl-FilterCoefficientDMRS-r16 FilterCoefficient DEFAULT fc4,
    ...
}

-- TAG-SL-QuantityConfig-STOP
-- ASN1STOP
```

SL-QuantityConfig field descriptions

sI-FilterCoefficientDMRS

DMRS based L3 filter configuration:

Specifies L3 filter configuration for sidelink RSRP measurement result from the L1 fiter(s), as defined in TS 38.215 [9].

SL-RadioBearerConfig

The IE SL-RadioBearerConfig specifies the sidelink DRB configuration information for NR sidelink communication.

SL-RadioBearerConfig information element

```
-- TAG-SL-RADIOBEARERCONFIG-START
SL-RadioBearerConfig-r16 ::=
    slrb-Uu-ConfiqIndex-r16
                                     SLRB-Uu-ConfigIndex-r16,
    sl-SDAP-Config-r16
                                     SL-SDAP-Config-r16
                                                                                                        OPTIONAL.
                                                                                                                     -- Cond SLRBSetup
    sl-PDCP-Config-r16
                                     SL-PDCP-Config-r16
                                                                                                        OPTIONAL,
                                                                                                                     -- Cond SLRBSetup
    sl-TransRange-r16
                                     ENUMERATED {m20, m50, m80, m100, m120, m150, m180, m200, m220, m250, m270, m300, m350, m370,
                                                m400, m420, m450, m480, m500, m550, m600, m700, m1000, spare9, spare8, spare7, spare6,
                                                spare5, spare4, spare3, spare2, spare1}
                                                                                                       OPTIONAL, -- Need R
-- TAG-SL-RADIOBEARERCONFIG-STOP
-- ASN1STOP
```

sI-PDCP-Config

This field indicates the PDCP parameters for the sidelink DRB.

sI-SDAP-Config

This field indicates how to map sidelink QoS flows to sidelink DRB.

slrb-Uu-ConfigIndex

This field indicates the index of sidelink DRB configuration.

sI-TransRange

This field indicates the transmission range of the sidelink DRB. The unit is meter.

Conditional Presence	Explanation
SLRBSetup	The field is mandatory present in case of sidelink DRB setup via the dedicated signalling and in case of sidelink DRB
·	configuration via system information and pre-configuration; otherwise the field is optionally present, need M.

SL-RadioBearerConfig field descriptions

SL-RelayUE-Config

-- TAG-SL-RELAYUE-CONFIG-STOP

The IE SL-RelayUE-Config specifies the configuration information for NR sidelink U2N Relay UE.

SL-RelayUE-Config information element

```
-- ASN1START
-- TAG-SL-RELAYUE-CONFIG-START
SL-RelayUE-Config-r17::=
                                  SEOUENCE {
    threshHighRelay-r17
                                                                              OPTIONAL,
                                                                                            -- Need R
                                      RSRP-Range
    threshLowRelay-r17
                                      RSRP-Range
                                                                              OPTIONAL,
                                                                                            -- Need R
   hystMaxRelay-r17
                                                                                            -- Cond ThreshHighRelay
                                      Hysteresis
                                                                              OPTIONAL,
   hystMinRelay-r17
                                                                              OPTIONAL
                                                                                           -- Cond ThreshLowRelay
                                      Hysteresis
```

-- ASN1STOP

SL-RelayUE-Config field descriptions

threshHighRelay

Indicates the upper threshold of Uu RSRP for a UE that is in network coverage to evaluate AS layer conditions for U2N relay UE operation.

threshLowRelay

Indicates the lower threshold of Uu RSRP for a UE that is in network coverage to evaluate AS layer conditions for U2N relay UE operation.

Conditional Presence	Explanation
ThreshHighRelay	This field is mandatory present if threshHighRelay is included. Otherwise, the field is absent, Need R.
ThreshLowRelay	This field is mandatory present if threshLowRelay is included. Otherwise, the field is absent, Need R.

SL-RemoteUE-Config

The IE SL-RemoteUE-Config specifies the configuration information for NR sidelink U2N Remote UE.

SL-RemoteUE-Config information element

```
-- ASN1START
-- TAG-SL-REMOTEUE-CONFIG-START
SL-RemoteUE-Config-r17::=
                                   SEQUENCE {
    threshHighRemote-r17
                                       RSRP-Range
                                                                                        OPTIONAL,
                                                                                                      -- Need R
   hystMaxRemote-r17
                                       Hysteresis
                                                                                                      -- Cond ThreshHighRemote
                                                                                        OPTIONAL,
    sl-ReselectionConfig-r17
                                       SL-ReselectionConfig-r17
                                                                                        OPTIONAL
                                                                                                      -- Need R
SL-ReselectionConfig-r17::=
                                   SEQUENCE {
    sl-RSRP-Thresh-r17
                                       SL-RSRP-Range-r16
                                                                                        OPTIONAL,
                                                                                                      -- Need R
    sl-FilterCoefficientRSRP-r17
                                       FilterCoefficient
                                                                                        OPTIONAL,
                                                                                                      -- Need R
    sl-HystMin-r17
                                       Hysteresis
                                                                                        OPTIONAL
                                                                                                      -- Cond SL-RSRP-Thresh
-- TAG-SL-REMOTEUE-CONFIG-STOP
-- ASN1STOP
```

SL-RemoteUE-Config field descriptions

sl-ReselectionConfig

Includes the parameters used by the U2N remote UE when selecting/ reselecting a U2N relay UE.

thresHighRemote

Indicates the threshold of Uu RSRP for a UE that is in network coverage to evaluate AS layer conditions for U2N remote UE operation.

SL-ReselectionConfig field descriptions

sl-FilterCoefficientRSRP

Specifies L3 filter coefficient for SL communication/ discovery RSRP measurement results from L1 filter.

sl-RSRP-Thresh

Indicates the threshold of SL communication/ discovery RSRP for a U2N remote UE to perform relay UE selection/ reselection.

Conditional Presence	Explanation
SL-RSRP-Thresh	This field is mandatory present if sl-RSRP-Thresh is included. Otherwise, the field is absent, Need R.
ThreshHighRemote	This field is mandatory present if threshHighRemote is included. Otherwise, the field is absent, Need R.

SL-ReportConfigList

The IE SL-ReportConfigList concerns a list of SL measurement reporting configurations to add or modify for a destination.

SL-ReportConfigList information element

```
-- ASN1START
-- TAG-SL-REPORTCONFIGLIST-START
                                      SEQUENCE (SIZE (1..maxNrofSL-ReportConfigId-r16)) OF SL-ReportConfigInfo-r16
SL-ReportConfigList-r16 ::=
SL-ReportConfigInfo-r16 ::=
                                      SEQUENCE {
    sl-ReportConfiqId-r16
                                              SL-ReportConfigId-r16,
    sl-ReportConfig-r16
                                              SL-ReportConfig-r16,
SL-ReportConfigId-r16 ::=
                                      INTEGER (1..maxNrofSL-ReportConfigId-r16)
SL-ReportConfig-r16 ::=
                                      SEQUENCE {
    sl-ReportType-r16
                                          CHOICE {
       sl-Periodical-r16
                                              SL-PeriodicalReportConfig-r16,
       sl-EventTriggered-r16
                                              SL-EventTriggerConfig-r16,
SL-PeriodicalReportConfig-r16 ::=
                                      SEOUENCE {
    sl-ReportInterval-r16
                                          ReportInterval,
    sl-ReportAmount-r16
                                          ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    sl-ReportQuantity-r16
                                          SL-MeasReportQuantity-r16,
    sl-RS-Type-r16
                                          SL-RS-Type-r16,
SL-EventTriggerConfig-r16 ::=
                                     SEQUENCE {
    sl-EventId-r16
                                         CHOICE {
```

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```
eventS1-r16
                                             SEQUENCE {
            s1-Threshold-r16
                                                 SL-MeasTriggerQuantity-r16,
            sl-ReportOnLeave-r16
                                                 BOOLEAN,
            sl-Hysteresis-r16
                                                 Hysteresis,
            sl-TimeToTrigger-r16
                                                 TimeToTrigger,
        eventS2-r16
                                             SEOUENCE {
            s2-Threshold-r16
                                                 SL-MeasTriggerQuantity-r16,
            sl-ReportOnLeave-r16
                                                 BOOLEAN,
            sl-Hysteresis-r16
                                                 Hysteresis,
            sl-TimeToTrigger-r16
                                                 TimeToTrigger,
        },
        . . .
    sl-ReportInterval-r16
                                         ReportInterval,
    sl-ReportAmount-r16
                                             ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
                                             SL-MeasReportQuantity-r16,
    sl-ReportQuantity-r16
    sl-RS-Type-r16
                                             SL-RS-Type-r16,
SL-MeasReportQuantity-r16 ::=
                                      CHOICE {
    sl-RSRP-r16
                                          BOOLEAN,
    . . .
SL-MeasTriggerQuantity-r16 ::=
                                      CHOICE {
    sl-RSRP-r16
                                          RSRP-Range,
    . . .
SL-RS-Type-r16 ::=
                                      ENUMERATED {dmrs, spare3, spare2, spare1}
-- TAG-SL-REPORTCONFIGLIST-STOP
-- ASN1STOP
```

SL-ReportConfig field descriptions

sl-ReportType

Type of the configured sidelink measurement report.

SL-EventTriggerConfig field descriptions

sl-EventId

Choice of sidelink measurement event triggered reporting criteria.

sI-ReportAmount

Number of sidelink measurement reports applicable for sl-EventTriggered report type.

sI-ReportInterval

Indicates the interval between periodical reports (i.e., when sl-ReportAmount exceeds 1) for sl-EventTriggered report type.

sI-ReportOnLeave

indicates whether or not the UE shall initiate the sidelink measurement reporting procedure when the leaving condition is met for a frequency in sl-FrequencyTriggeredList, as specified in 5.8.10.4.1.

sl-ReportQuantity

The sidelink measurement quantities to be included in the sidelink measurement report.

sI-TimeToTrigger

Time during which specific criteria for the event needs to be met in order to trigger a sidelink measurement report.

sN-Threshold

Threshold used for events S1 and S2 specified in clauses 5.8.10.4.2 and 5.8.10.4.3, respectively.

SL-PeriodicalReportConfig field descriptions

sl-ReportAmount

Number of sidelink measurement reports applicable for sI-Periodical report type.

sl-ReportInterval

Indicates the interval between periodical reports (i.e., when sl-ReportAmount exceeds 1) for sl-Periodical report type.

sl-ReportQuantity

The sidelink measurement quantities to be included in the sidelink measurement report.

SL-ResourcePool

The IE SL-ResourcePool specifies the configuration information for NR sidelink communication resource pool.

SL-ResourcePool information element

```
-- ASN1START
-- TAG-SL-RESOURCEPOOL-START
SL-ResourcePool-r16 ::=
                                  SEOUENCE {
   sl-PSCCH-Config-r16
                                      SetupRelease { SL-PSCCH-Config-r16 }
                                                                                                           OPTIONAL, -- Need M
   sl-PSSCH-Config-r16
                                      SetupRelease { SL-PSSCH-Config-r16
                                                                                                           OPTIONAL, -- Need M
                                      SetupRelease { SL-PSFCH-Config-r16 }
    sl-PSFCH-Config-r16
                                                                                                           OPTIONAL, -- Need M
                                                                                                           OPTIONAL, -- Need M
    sl-SyncAllowed-r16
                                      SL-SyncAllowed-r16
    sl-SubchannelSize-r16
                                      ENUMERATED {n10, n12, n15, n20, n25, n50, n75, n100}
                                                                                                           OPTIONAL, -- Need M
                                      INTEGER (10..160)
                                                                                                           OPTIONAL, -- Need M
                                                                                                           OPTIONAL, -- Need M
    sl-StartRB-Subchannel-r16
                                      INTEGER (0..265)
    sl-NumSubchannel-r16
                                      INTEGER (1..27)
                                                                                                           OPTIONAL, -- Need M
    sl-Additional-MCS-Table-r16
                                      ENUMERATED {gam256, gam64LowSE, gam256-gam64LowSE }
                                                                                                           OPTIONAL, -- Need M
    sl-ThreshS-RSSI-CBR-r16
                                      INTEGER (0..45)
                                                                                                           OPTIONAL, -- Need M
                                                                                                           OPTIONAL, -- Need M
    sl-TimeWindowSizeCBR-r16
                                      ENUMERATED {ms100, slot100}
```

```
sl-TimeWindowSizeCR-r16
                                       ENUMERATED {ms1000, slot1000}
                                                                                                            OPTIONAL,
                                                                                                                        -- Need M
    sl-PTRS-Config-r16
                                       SL-PTRS-Config-r16
                                                                                                            OPTIONAL.
                                                                                                                         -- Need M
    sl-UE-SelectedConfigRP-r16
                                       SL-UE-SelectedConfigRP-r16
                                                                                                            OPTIONAL.
                                                                                                                        -- Need M
    sl-RxParametersNcell-r16
                                      SEOUENCE {
        sl-TDD-Configuration-r16
                                           TDD-UL-DL-ConfigCommon
                                                                                                             OPTIONAL.
                                                                                                                        -- Need M
       sl-SyncConfigIndex-r16
                                          INTEGER (0..15)
                                                                                                            OPTIONAL,
                                                                                                                        -- Need M
    sl-ZoneConfiqMCR-List-r16
                                       SEQUENCE (SIZE (16)) OF SL-ZoneConfigMCR-r16
                                                                                                            OPTIONAL, -- Need M
                                                                                                            OPTIONAL, -- Need M
    sl-FilterCoefficient-r16
                                       FilterCoefficient
                                                                                                            OPTIONAL, -- Need M
    sl-RB-Number-r16
                                       INTEGER (10..275)
    sl-PreemptionEnable-r16
                                       ENUMERATED {enabled, pl1, pl2, pl3, pl4, pl5, pl6, pl7, pl8}
                                                                                                            OPTIONAL, -- Need R
                                                                                                            OPTIONAL, -- Need M
    sl-PriorityThreshold-UL-URLLC-r16 INTEGER (1..9)
                                                                                                            OPTIONAL, -- Need M
    sl-PriorityThreshold-r16
                                      INTEGER (1..9)
    sl-X-Overhead-r16
                                       ENUMERATED {n0,n3, n6, n9}
                                                                                                            OPTIONAL.
                                                                                                                       -- Need S
    sl-PowerControl-r16
                                       SL-PowerControl-r16
                                                                                                            OPTIONAL, -- Need M
    sl-TxPercentageList-r16
                                       SL-TxPercentageList-r16
                                                                                                            OPTIONAL, -- Need M
    sl-MinMaxMCS-List-r16
                                                                                                                        -- Need M
                                      SL-MinMaxMCS-List-r16
                                                                                                            OPTIONAL,
    [ [
    sl-TimeResource-r16
                                      BIT STRING (SIZE (10..160))
                                                                                                            OPTIONAL
                                                                                                                        -- Need M
    11.
    11
    sl-PBPS-CPS-Config-r17
                                       SetupRelease { SL-PBPS-CPS-Config-r17 }
                                                                                                            OPTIONAL,
                                                                                                                        -- Need M
    sl-InterUE-CoordinationConfig-r17 SetupRelease { SL-InterUE-CoordinationConfig-r17 }
                                                                                                            OPTIONAL
                                                                                                                        -- Need M
    11
SL-ZoneConfigMCR-r16 ::=
                                       SEQUENCE {
    sl-ZoneConfiqMCR-Index-r16
                                           INTEGER (0..15),
    sl-TransRange-r16
                                           ENUMERATED {m20, m50, m80, m100, m120, m150, m180, m200, m220, m250, m270, m300, m350,
                                                      m370, m400, m420, m450, m480, m500, m550, m600, m700, m1000, spare9, spare8,
                                                      spare7, spare6, spare5, spare4, spare3, spare2, spare1}
                                                                                                             OPTIONAL. -- Need M
                                                                                                            OPTIONAL, -- Need M
    sl-ZoneConfig-r16
                                          SL-ZoneConfig-r16
    . . .
SL-SyncAllowed-r16 ::=
                                      SEOUENCE {
                                           ENUMERATED {true}
    qnss-Sync-r16
                                                                                                            OPTIONAL, -- Need R
    gnbEnb-Sync-r16
                                           ENUMERATED {true}
                                                                                                             OPTIONAL, -- Need R
                                           ENUMERATED {true}
                                                                                                                        -- Need R
    ue-Sync-r16
                                                                                                            OPTIONAL
SL-PSCCH-Config-r16 ::=
                                      SEOUENCE {
    sl-TimeResourcePSCCH-r16
                                          ENUMERATED {n2, n3}
                                                                                                             OPTIONAL,
                                                                                                                       -- Need M
                                          ENUMERATED {n10, n12, n15, n20, n25}
    sl-FregResourcePSCCH-r16
                                                                                                            OPTIONAL,
                                                                                                                       -- Need M
    sl-DMRS-ScrambleID-r16
                                          INTEGER (0..65535)
                                                                                                            OPTIONAL, -- Need M
    sl-NumReservedBits-r16
                                          INTEGER (2..4)
                                                                                                            OPTIONAL, -- Need M
SL-PSSCH-Config-r16 ::=
                                       SEOUENCE {
    sl-PSSCH-DMRS-TimePatternList-r16
                                                                                                            OPTIONAL, -- Need M
                                          SEQUENCE (SIZE (1..3)) OF INTEGER (2..4)
    sl-BetaOffsets2ndSCI-r16
                                                                                                            OPTIONAL, -- Need M
                                           SEQUENCE (SIZE (4)) OF SL-BetaOffsets-r16
```

```
ENUMERATED {f0p5, f0p65, f0p8, f1}
    sl-Scaling-r16
                                                                                                            OPTIONAL, -- Need M
SL-PSFCH-Config-r16 ::=
                                      SEOUENCE {
                                          ENUMERATED {s10, s11, s12, s14}
    sl-PSFCH-Period-r16
                                                                                                            OPTIONAL, -- Need M
    sl-PSFCH-RB-Set-r16
                                          BIT STRING (SIZE (10..275))
                                                                                                            OPTIONAL, -- Need M
    sl-NumMuxCS-Pair-r16
                                          ENUMERATED {n1, n2, n3, n6}
                                                                                                            OPTIONAL, -- Need M
    sl-MinTimeGapPSFCH-r16
                                          ENUMERATED {sl2, sl3}
                                                                                                            OPTIONAL, -- Need M
                                          INTEGER (0..1023)
                                                                                                            OPTIONAL, -- Need M
    sl-PSFCH-HopID-r16
    sl-PSFCH-CandidateResourceType-r16
                                          ENUMERATED {startSubCH, allocSubCH}
                                                                                                            OPTIONAL, -- Need M
SL-PTRS-Config-r16 ::=
                                      SEOUENCE {
    sl-PTRS-FreqDensity-r16
                                          SEQUENCE (SIZE (2)) OF INTEGER (1..276)
                                                                                                            OPTIONAL,
                                                                                                                       -- Need M
    sl-PTRS-TimeDensity-r16
                                          SEQUENCE (SIZE (3)) OF INTEGER (0..29)
                                                                                                            OPTIONAL, -- Need M
                                          ENUMERATED {offset01, offset10, offset11}
                                                                                                            OPTIONAL, -- Need M
    sl-PTRS-RE-Offset-r16
SL-UE-SelectedConfigRP-r16 ::=
                                      SEOUENCE {
    sl-CBR-PriorityTxConfigList-r16
                                          SL-CBR-PriorityTxConfigList-r16
                                                                                                           OPTIONAL, -- Need M
    sl-Thres-RSRP-List-r16
                                          SL-Thres-RSRP-List-r16
                                                                                                            OPTIONAL, -- Need M
                                                                                                            OPTIONAL, -- Need M
    sl-MultiReserveResource-r16
                                          ENUMERATED {enabled}
    sl-MaxNumPerReserve-r16
                                          ENUMERATED {n2, n3}
                                                                                                            OPTIONAL, -- Need M
    sl-SensingWindow-r16
                                          ENUMERATED {ms100, ms1100}
                                                                                                            OPTIONAL, -- Need M
                                                                                                            OPTIONAL, -- Need M
    sl-SelectionWindowList-r16
                                          SL-SelectionWindowList-r16
    sl-ResourceReservePeriodList-r16
                                          SEQUENCE (SIZE (1..16)) OF SL-ResourceReservePeriod-r16
                                                                                                            OPTIONAL,
                                                                                                                       -- Need M
    sl-RS-ForSensing-r16
                                          ENUMERATED {pscch, pssch},
    11
    sl-CBR-PriorityTxConfigList-v1650
                                          SL-CBR-PriorityTxConfigList-v1650
                                                                                                            OPTIONAL
                                                                                                                       -- Need M
    11
SL-ResourceReservePeriod-r16 ::=
                                      CHOICE {
    sl-ResourceReservePeriod1-r16
                                           ENUMERATED {ms0, ms100, ms200, ms300, ms400, ms500, ms600, ms700, ms800, ms900, ms1000},
                                          INTEGER (1..99)
    sl-ResourceReservePeriod2-r16
SL-SelectionWindowList-r16 ::=
                                      SEQUENCE (SIZE (8)) OF SL-SelectionWindowConfig-r16
SL-SelectionWindowConfig-r16 ::=
                                      SEQUENCE {
    sl-Priority-r16
                                          INTEGER (1..8),
    sl-SelectionWindow-r16
                                          ENUMERATED {n1, n5, n10, n20}
SL-TxPercentageList-r16 ::=
                                      SEQUENCE (SIZE (8)) OF SL-TxPercentageConfig-r16
SL-TxPercentageConfig-r16 ::=
                                      SEOUENCE {
    sl-Priority-r16
                                          INTEGER (1..8),
    sl-TxPercentage-r16
                                          ENUMERATED {p20, p35, p50}
```

```
SL-MinMaxMCS-List-r16 ::=
                                      SEQUENCE (SIZE (1..3)) OF SL-MinMaxMCS-Config-r16
SL-MinMaxMCS-Config-r16 ::=
                                      SEQUENCE {
    sl-MCS-Table-r16
                                          ENUMERATED { qam64, qam256, qam64LowSE },
    sl-MinMCS-PSSCH-r16
                                          INTEGER (0..27),
    sl-MaxMCS-PSSCH-r16
                                          INTEGER (0..31)
SL-BetaOffsets-r16 ::=
                                      INTEGER (0..31)
SL-PowerControl-r16 ::=
                          SEQUENCE {
    sl-MaxTransPower-r16
                              INTEGER (-30..33),
    sl-Alpha-PSSCH-PSCCH-r16 ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}
                                                                                                                OPTIONAL, -- Need M
    dl-Alpha-PSSCH-PSCCH-r16 ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}
                                                                                                                OPTIONAL, -- Need S
    sl-P0-PSSCH-PSCCH-r16
                              INTEGER (-16..15)
                                                                                                                OPTIONAL, -- Need S
    dl-P0-PSSCH-PSCCH-r16
                              INTEGER (-16..15)
                                                                                                                OPTIONAL, -- Need M
                              ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}
                                                                                                                OPTIONAL, -- Need S
    dl-Alpha-PSFCH-r16
    dl-P0-PSFCH-r16
                              INTEGER (-16..15)
                                                                                                                OPTIONAL, -- Need M
    . . . ,
    11
    dl-P0-PSSCH-PSCCH-r17
                              INTEGER (-202..24)
                                                                                                                OPTIONAL,
                                                                                                                           -- Need M
                                                                                                                OPTIONAL, -- Need S
    sl-P0-PSSCH-PSCCH-r17
                              INTEGER (-202..24)
    dl-P0-PSFCH-r17
                                                                                                                OPTIONAL
                                                                                                                          -- Need M
                              INTEGER (-202..24)
    11
-- TAG-SL-RESOURCEPOOL-STOP
-- ASN1STOP
```

SL-ZoneConfigMCR field descriptions

sl-TransRange

Indicates the communication range requirement for the corresponding sl-ZoneConfigMCR-Index.

sI-ZoneConfia

Indicates the zone configuration for the corresponding sI-ZoneConfigMCR-Index.

sI-ZoneConfigMCR-Index

Indicates the codepoint of the communication range requirement field in SCI.

SL-ResourcePool field descriptions

dummy

This field is not used in the specification. If received it shall be ignored by the UE.

sl-Additional-MCS-Table

Indicates the MCS table(s) additionally used in the resource pool. 64QAM table is (pre-)configured as default. Zero, one or two can be additionally (pre-)configured using the 256QAM and/or low-SE MCS tables. If two MCS tables are indicated, 256QAM MCS table is the 1st table and qam64lowSE MCS table is the 2nd table as specified in TS 38.214 [19], clause 8.1.3.1.

sl-FilterCoefficient

This field indicates the filtering coefficient for long-term measurement and reference signal power derivation used for sidelink open-loop power control.

sI-InterUE-CoordinationConfig

Indicates the configured sidelink inter-UE coordination parameters.

sl-NumSubchannel

Indicates the number of subchannels in the corresponding resource pool, which consists of contiguous PRBs only.

sI-PBPS-CPS-Confia

Indicates the allowed resource allocation schemes of full sensing only, partial sensing only, random resource selection only, or any combination(s), and the related configuration for power saving resource allocation schemes. This field is absent for sl-TxPoolExceptional.

sI-PreemptionEnable

Indicates whether pre-emption is disabled or enabled in a resource pool. If the field is present and the value is *pl1*, *pl2*, and so on (but not *enabled*), it means that pre-emption is enabled and a priority level p_preemption is configured. If the field is present and the value is *enabled*, the pre-emption is enabled (but p_preemption is not configured) and pre-emption is applicable to all levels.

sl-PriorityThreshold-UL-URLLC

Indicates the threshold used to determine whether NR sidelink transmission is prioritized over uplink transmission of priority index 1 as specified in TS 38.213[13], clause 16.2.4.3, or whether PUCCH transmission carrying SL HARQ is prioritized over PUCCH transmission carrying UCI of priority index 1 if they overlap in time as specified in TS 38.213 [13], clause 9.2.5.0.

sl-PrioritvThreshold

Indicates the threshold used to determine whether NR sidelink transmission is prioritized over uplink transmission of priority index 0 as specified in TS 38.213[13], clause 16.2.4.3, or whether PUCCH transmission carrying SL HARQ is prioritized over PUCCH transmission carrying UCI of priority index 0 if they overlap in time as specified in TS 38.213 [13], clause 9.2.5.0.

sl-RB-Number

Indicates the number of PRBs in the corresponding resource pool, which consists of contiguous PRBs only. The remaining RB cannot be used (See TS 38.214[19], clause 8).

sI-StartRB-Subchannel

Indicates the lowest RB index of the subchannel with the lowest index in the resource pool with respect to the lowest RB index of a SL BWP.

sl-SubchannelSize

Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB.

sl-SyncAllowed

Indicates the allowed synchronization reference(s) which is (are) allowed to use the configured resource pool.

sI-SvncConfiaIndex

Indicates the synchronisation configuration that is associated with a reception pool, by means of an index to the corresponding entry *SL-SyncConfigList* of in *SIB12* for NR sidelink communication.

sI-TDD-Configuration

Indicates the TDD configuration associated with the reception pool of the cell indicated by sl-SyncConfigIndex.

sI-ThreshS-RSSI-CBR

Indicates the S-RSSI threshold for determining the contribution of a sub-channel to the CBR measurement. Value 0 corresponds to -112 dBm, value 1 to -110 dBm, value n to (-112 + n*2) dBm, and so on.

sl-TimeResource

Indicates the bitmap of the resource pool, which is defined by repeating the bitmap with a periodicity during a SFN or DFN cycle.

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sI-TimeWindowSizeCBR

Indicates the time window size for CBR measurement.

sI-TimeWindowSizeCR

Indicates the time window size for CR evaluation.

sl-TxPercentageList

Indicates the portion of candidate single-slot PSSCH resources over the total resources. Value p20 corresponds to 20%, and so on.

sl-X-Overhead

Accounts for overhead from CSI-RS, PT-RS. If the field is absent, the UE applies value n0 (see TS 38.214 [19], clause 5.1.3.2).

SL-SyncAllowed field descriptions

gnbEnb-Sync

If configured, the (pre-) configured resources can be used if the UE is directly or indirectly synchronized to eNB or gNB (i.e., synchronized to a reference UE which is directly synchronized to eNB or gNB).

gnss-Sync

If configured, the (pre-) configured resources can be used if the UE is directly or indirectly synchronized to GNSS (i.e., synchronized to a reference UE which is directly synchronized to GNSS).

ue-Sync

If configured, the (pre-) configured resources can be used if the UE is synchronized to a reference UE which is not synchronized to eNB, gNB and GNSS directly or indirectly.

SL-PSCCH-Config field descriptions

sI-FreqResourcePSCCH

Indicates the number of PRBs for PSCCH in a resource pool where it is not greater than the number PRBs of the subchannel.

sI-DMRS-ScrambleID

Indicates the initialization value for PSCCH DMRS scrambling.

sI-NumReservedBits

Indicates the number of reserved bits in first stage SCI.

sI-TimeResourcePSCCH

Indicates the number of symbols of PSCCH in a resource pool.

SL-PSSCH-Config field descriptions

sI-BetaOffsets2ndSCI

Indicates candidates of beta-offset values to determine the number of coded modulation symbols for second stage SCI. The value indicates the index of Table 9.3-2 of TS 38.213 [13].

sI-PSSCH-DMRS-TimePatternList

Indicates the set of PSSCH DMRS time domain patterns in terms of PSSCH DMRS symbols in a slot that can be used in the resource pool.

sl-Scaling

Indicates a scaling factor to limit the number of resource elements assigned to the second stage SCI on PSSCH. Value *f0p5* corresponds to 0.5, value *f0p65* corresponds to 0.65, and so on.

SL-PSFCH-Config field descriptions

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sI-MinTimeGapPSFCH

The minimum time gap between PSFCH and the associated PSSCH in the unit of slots.

sI-NumMuxCS-Pair

Indicates the number of cyclic shift pairs used for a PSFCH transmission that can be multiplexed in a PRB.

sI-PSFCH-CandidateResourceType

Indicates the number of PSFCH resources available for multiplexing HARQ-ACK information in a PSFCH transmission (see TS 38.213 [13], clause 16.3).

sI-PSFCH-HopID

Scrambling ID for sequence hopping of the PSFCH used in the resource pool.

sI-PSFCH-Period

Indicates the period of PSFCH resource in the unit of slots within this resource pool. If set to sl0, no resource for PSFCH, and HARQ feedback for all transmissions in the resource pool is disabled.

sI-PSFCH-RB-Set

Indicates the set of PRBs that are actually used for PSFCH transmission and reception. The leftmost bit of the bitmap refers to the lowest RB index in the resource pool, and so on. Value 0 in the bitmap indicates that the corresponding PRB is not used for PSFCH transmission and reception while value 1 indicates that the corresponding PRB is used for PSFCH transmission and reception (see TS 38.213 [13]).

SL-PTRS-Config field descriptions

sI-PTRS-FreqDensity

Presence and frequency density of SL PT-RS as a function of scheduled BW. If the field is not configured, the UE uses K_PT-RS = 2

sI-PTRS-TimeDensity

Presence and time density of SL PT-RS as a function of MCS. If the field is not configured, the UE uses L_PT-RS = 1

sI-PTRS-RE-Offset

Indicates the subcarrier offset for SL PT-RS. If the field is not configured, the UE applies the value offset00 (see TS 38.211 [16], clause 8.4.1.2.2).

SL-UE-SelectedConfigRP field descriptions

1113

sI-CBR-PriorityTxConfigList

Indicates the mapping between PSSCH transmission parameter (such as MCS, PRB number, retransmission number, CR limit) sets by using the indexes of the configurations in *sl-CBR-PSSCH-TxConfigList*, CBR ranges by using the indexes to the entry of the CBR range configurations in *sl-CBR-RangeConfigList*, and priority ranges. It also indicates the default PSSCH transmission parameters to be used when CBR measurement results are not available, and MCS range for the MCS tables used in the resource pool. The field *sl-CBR-PriorityTxConfigList-v1650* is present only when *sl-CBR-PriorityTxConfigList-r16* is configured.

sI-MaxNumPerReserve

Indicates the maximum number of reserved PSCCH/PSSCH resources that can be indicated by an SCI.

sl-MultiReserveResource

Indicates if it is allowed to reserve a sidelink resource for an initial transmission of a TB by an SCI associated with a different TB, based on sensing and resource selection procedure.

sl-ResourceReservePeriodList

Set of possible resource reservation period allowed in the resource pool in the unit of ms. Up to 16 values can be configured per resource pool. The value ms0 is always configured.

sI-RS-ForSensing

Indicates whether DMRS of PSCCH or PSSCH is used for L1 RSRP measurement in the sensing operation.

sI-SensinaWindow

Parameter that indicates the start of the sensing window.

sl-SelectionWindowList

Parameter that determines the end of the selection window in the resource selection for a TB with respect to priority indicated in SCI. Value n1 corresponds to $1*2^{\mu}$, value n5 corresponds to $5*2^{\mu}$, and so on, where $\mu = 0.1, 2.3$ refers to SCS 15,30,60,120 kHz respectively.

sI-Thres-RSRP-List

Indicates a list of 64 thresholds, and the threshold should be selected based on the priority in the decoded SCI and the priority in the SCI to be transmitted. A resource is excluded if it is indicated or reserved by a decoded SCI and PSSCH/PSCCH RSRP in the associated data resource is above a threshold.

SL-PowerControl field descriptions

sl-MaxTransPower

Indicates the maximum value of the UE's sidelink transmission power on this resource pool. The unit is dBm.

sI-Alpha-PSSCH-PSCCH

Indicates alpha value for sidelink pathloss based power control for PSCCH/PSSCH when sI-P0-PSSCH-PSCCH is configured. When the field is absent the UE applies the value 1.

sI-P0-PSSCH-PSCCH

Indicates P0 value for sidelink pathloss based power control for PSCCH/PSSCH. If not configured, sidelink pathloss based power control is disabled for PSCCH/PSSCH. When sI-P0-PSSCH-PSCCH-r17 is configured, the UE ignores sI-P0-PSSCH-PSCCH-r16.

dl-Alpha-PSSCH-PSCCH

Indicates alpha value for downlink pathloss based power control for PSCCH/PSSCH when *dl-P0-PSSCH-PSCCH* is configured. When the field is absent the UE applies the value 1.

dI-P0-PSSCH-PSCCH

Indicates P0 value for downlink pathloss based power control for PSCCH/PSSCH. If not configured, downlink pathloss based power control is disabled for PSCCH/PSSCH. When *dl-P0-PSSCH-PSCCH-r17* is configured, the UE ignores *dl-P0-PSSCH-PSCCH-r16*.

dl-Alpha-PSFCH

Indicates alpha value for downlink pathloss based power control for PSFCH when dl-P0-PSFCH is configured. When the field is absent the UE applies the value 1.

dI-P0-PSFCH

Indicates P0 value for downlink pathloss based power control for PSFCH. If not configured, downlink pathloss based power control is disabled for PSFCH. When *dl-P0-PSFCH-r17* is configured, the UE ignores *dl-P0-PSFCH-r16*.

SL-MinMaxMCS-Config field descriptions

sI-MaxMCS-PSSCH

Indicates the maximum MCS value when using the associated MCS table. If no MCS is configured, UE autonomously selects MCS from the full range of values.

sI-MinMCS-PSSCH

Indicates the minimum MCS value when using the associated MCS table. If no MCS is configured, UE autonomously selects MCS from the full range of values.

SL-RLC-BearerConfig

The IE SL-RLC-BearerConfig specifies the SL RLC bearer configuration information for NR sidelink communication.

SL-RLC-BearerConfig information element

```
-- ASN1START
-- TAG-SL-RLC-BEARERCONFIG-START
SL-RLC-BearerConfig-r16 ::=
                                             SEOUENCE {
    sl-RLC-BearerConfigIndex-r16
                                                 SL-RLC-BearerConfigIndex-r16,
    sl-ServedRadioBearer-r16
                                                 SLRB-Uu-ConfigIndex-r16
                                                                                                 OPTIONAL, -- Cond LCH-SetupOnly
    sl-RLC-Config-r16
                                                 SL-RLC-Config-r16
                                                                                                 OPTIONAL, -- Cond LCH-Setup
                                                                                                 OPTIONAL, -- Cond LCH-Setup
    sl-MAC-LogicalChannelConfig-r16
                                                 SL-LogicalChannelConfig-r16
-- TAG-SL-RLC-BEARERCONFIG-STOP
```

-- ASN1STOP

SI -RI C-F	BearerConfig	field des	crintions

sI-MAC-LogicalChannelConfig

The field is used to configure MAC SL logical channel parameters.

sI-RLC-BearerConfigIndex

The index of the RLC bearer configuration.

sI-RLC-Config

Determines the RLC mode (UM, AM) and provides corresponding parameters.

sl-ServedRadioBearer

Associates the sidelink RLC Bearer with a sidelink DRB. It indicates the index of SL radio bearer configuration, which is corresponding to the RLC bearer configuration.

Conditional Presence	Explanation
LCH-Setup	The field is mandatory present upon creation of a new sidelink logical channel via the dedicated signalling and in case of
	sidelink DRB configuration via system information and pre-configuration; otherwise the field is optionally present, Need M.
LCH-SetupOnly	This field is mandatory present upon creation of a new sidelink logical channel via the dedicated signalling and in case of
	sidelink DRB configuration via system information and pre-configuration. Otherwise, it is absent, Need M.

SL-RLC-BearerConfigIndex

The IE SL-RLC-BearerConfigIndex is used to identify a SL RLC bearer configuration.

SL-RLC-BearerConfigIndex information element

```
-- ASN1START
-- TAG-SL-RLC-BEARERCONFIGINDEX-START

SL-RLC-BearerConfigIndex-r16 ::= INTEGER (1..maxSL-LCID-r16)

-- TAG-RLC-BEARERCONFIGINDEX-STOP
-- ASN1STOP
```

SL-RLC-ChannelConfig

The IE SL-RLC-ChannelConfig specifies the configuration information for PC5 Relay RLC channel between L2 U2N Relay UE and L2 U2N Remote UE.

SL-RLC-ChannelConfig information element

```
-- ASN1START
-- TAG-SL-RLC-CHANNEL-CONFIG-START

SL-RLC-ChannelConfig-r17 ::= SEQUENCE {
    sl-RLC-ChannelID-r17 SL-RLC-ChannelID-r17,
```

```
sl-RLC-Config-r17 SL-RLC-Config-r16 OPTIONAL, -- Need M sl-MAC-LogicalChannelConfig-r17 SL-LogicalChannelConfig-r16 OPTIONAL, -- Need M sl-PacketDelayBudget-r17 INTEGER (0..1023) OPTIONAL, -- Need M ...}
```

SL-RLC-ChannelConfig field descriptions

sI-MAC-LogicalChannelConfig

-- TAG-SL-RLC-CHANNEL-CONFIG-STOP

The field is used to configure MAC SL logical channel parameters.

sI-RLC-ChannelID

Indicates the PC5 Relay RLC channel in the link between L2 U2N Relay UE and L2 U2N Remote UE.

sl-RLC-Config

-- ASN1STOP

Determines the RLC mode (UM, AM) and provides corresponding parameters.

sl-PacketDelayBudget

Indicates the Packet Delay Budget for a PC5 Relay RLC channel. Upper bound value for the delay that a packet may experience expressed in unit of 0.5ms.

SL-RLC-ChannelID

The IE SL-RLC-ChannelID is used to identify a PC5 Relay RLC channel in the link between L2 U2N Relay UE and L2 U2N Remote UE.

SL-RLC-ChannelID information element

```
-- ASN1START
-- TAG-SL-RLC-CHANNELID-START

SL-RLC-ChannelID-r17 ::= INTEGER (1..maxSL-LCID-r16)
-- TAG-SL-RLC-CHANNELID-STOP
-- ASN1STOP
```

- SL-RLC-Config

The IE SL-RLC-Config is used to specify the RLC configuration of sidelink DRB. RLC AM configuration is only applicable to the unicast NR sidelink communication.

SL-RLC-Config information element

```
-- ASN1START
-- TAG-SL-RLC-CONFIG-START

SL-RLC-Config-r16 ::= CHOICE {
    sl-AM-RLC-r16 SEQUENCE {
        sl-SN-FieldLengthAM-r16 SN-FieldLengthAM OPTIONAL, -- Cond SLRBSetup sl-T-PollRetransmit-r16 T-PollRetransmit,
```

```
sl-PollPDU-r16
                                                          PollPDU,
       sl-PollByte-r16
                                                          PollByte,
        sl-MaxRetxThreshold-r16
                                                          ENUMERATED { t1, t2, t3, t4, t6, t8, t16, t32 },
    },
    sl-UM-RLC-r16
                                                  SEOUENCE {
        sl-SN-FieldLengthUM-r16
                                                      SN-FieldLengthUM
                                                                                                       OPTIONAL.
                                                                                                                    -- Cond SLRBSetup
    },
    . . .
-- TAG-SL-RLC-CONFIG-STOP
-- ASN1STOP
```

SL-RLC-Config field descriptions

sl-MaxRetxThreshold

Parameter value of *maxRetxThreshold* for RLC AM for NR sidelink communications, see TS 38.322 [4]. Value *t1* corresponds to 1 retransmission, value *t2* corresponds to 2 retransmissions and so on.

sI-PollByte

Parameter value of *pollByte* for RLC AM for NR sidelink communications, see TS 38.322 [4]. Value *kB25* corresponds to 25 kBytes, value *kB50* corresponds to 50 kBytes and so on. *infinity* corresponds to an infinite amount of kBytes.

sI-PolIPDU

Parameter value of *pollPDU* for RLC AM for NR sidelink communications, seeTS 38.322 [4]. Value *p4* corresponds to 4 PDUs, value *p8* corresponds to 8 PDUs and so on. *infinity* corresponds to an infinite number of PDUs.

sI-SN-FieldLenath

This field indicates the RLC SN field size for NR sidelink communication, see TS 38.322 [4]. For groupcast and broadcast, only value size6 (6 bits) is configured for the field sl-SN-FieldLengthUM.

sI-T-PollRetransmit

Timer value of t-PollRetransmit for RLC AM for NR sidelink communications, see TS 38.322 [4], in milliseconds. Value ms5 means 5 ms, value ms10 means 10 ms and so on.

Conditional Presence	Explanation
SLRBSetup	The field is mandatory present in case of sidelink DRB setup via the dedicated signalling and in case of sidelink DRB
	configuration via system information and pre-configuration; otherwise the field is optionally present, need M.

SL-ScheduledConfig

The IE SL-ScheduledConfig specifies sidelink communication configurations used for network scheduled NR sidelink communication.

SL-ScheduledConfig information element

```
-- ASN1START
-- TAG-SL-SCHEDULEDCONFIG-START

SL-ScheduledConfig-r16 ::= SEQUENCE {
```

```
sl-RNTI-r16
                                                RNTI-Value,
    mac-MainConfiqSL-r16
                                                MAC-MainConfigSL-r16
                                                                                                         OPTIONAL.
                                                                                                                      -- Need M
    sl-CS-RNTI-r16
                                                RNTI-Value
                                                                                                         OPTIONAL.
                                                                                                                      -- Need M
    sl-PSFCH-ToPUCCH-r16
                                                SEQUENCE (SIZE (1..8)) OF INTEGER (0..15)
                                                                                                         OPTIONAL.
                                                                                                                      -- Need M
    sl-ConfiguredGrantConfigList-r16
                                                SL-ConfiguredGrantConfigList-r16
                                                                                                         OPTIONAL.
                                                                                                                      -- Need M
    Π
    sl-DCI-ToSL-Trans-r16
                                                SEQUENCE (SIZE (1..8)) OF INTEGER (1..32)
                                                                                                         OPTIONAL
                                                                                                                      -- Need M
    11
MAC-MainConfigSL-r16 ::=
                                            SEQUENCE {
    sl-BSR-Config-r16
                                                BSR-Config
                                                                                                     OPTIONAL,
                                                                                                                  -- Need M
    ul-PrioritizationThres-r16
                                                INTEGER (1..16)
                                                                                                     OPTIONAL.
                                                                                                                  -- Need M
    sl-PrioritizationThres-r16
                                                INTEGER (1..8)
                                                                                                     OPTIONAL,
                                                                                                                 -- Need M
SL-ConfiguredGrantConfigList-r16 ::=
                                          SEOUENCE {
    sl-ConfiguredGrantConfigToReleaseList-rl6 SEQUENCE (SIZE (1..maxNrofCG-SL-rl6)) OF SL-ConfigIndexCG-rl6
                                                                                                                OPTIONAL, -- Need N
    sl-ConfiguredGrantConfigToAddModList-r16 SEQUENCE (SIZE (1..maxNrofCG-SL-r16)) OF SL-ConfiguredGrantConfig-r16 OPTIONAL -- Need N
-- TAG-SL-SCHEDULEDCONFIG-STOP
-- ASN1STOP
```

SL-ScheduledConfig field descriptions

sI-CS-RNTI

Indicate the RNTI used to scramble CRC of DCI format 3 0, see TS 38.321 [3].

sI-DCI-ToSL-Trans

Indicate the time gap between DCI reception and the first sidelink transmission scheduled by the DCI (see TS 38.214 [19], clause 8.1.2.1). Value 1 included in this field corresponds to 1 slot, value 2 corresponds to 2 slots and so on, based on the numerology of sidelink BWP.

sI-PSFCH-ToPUCCH

For dynamic grant and configured grant type 2, this field configures the values (in number of slot lengths) of the PSFCH to PUCCH gap. The field PSFCH-to-HARQ_feedback timing indicator in DCI format 3 0 selects one of the configured values of the PSFCH to PUCCH gap.

sI-RNTI

Indicate the C-RNTI used for monitoring the network scheduling to transmit NR sidelink communication (i.e. the mode 1).

MAC-MainConfigSL field descriptions

sI-BSR-Config

This field is to configure the sidelink buffer status report.

sI-PrioritizationThres

Indicates the SL priority threshold, which is used to determine whether SL TX is prioritized over UL TX, as specified in TS 38.321 [3]. Network does not configure the *sl-PrioritizationThres* and the *ul-PrioritizationThres* to the UE separately.

ul-PrioritizationThres

Indicates the UL priority threshold, which is used to determine whether SL TX is prioritized over UL TX, as specified in TS 38.321 [3]. Network does not configure the *sl-PrioritizationThres* and the *ul-PrioritizationThres* to the UE separately.

SL-SDAP-Config

The IE SL-SDAP-Config is used to set the configurable SDAP parameters for a Sidelink DRB.

SL-SDAP-Config information element

```
-- ASN1START
-- TAG-SL-SDAP-CONFIG-START
SL-SDAP-Config-r16 ::=
                                      SEOUENCE {
   sl-SDAP-Header-r16
                                          ENUMERATED {present, absent},
    sl-DefaultRB-r16
                                          BOOLEAN.
   sl-MappedOoS-Flows-r16
                                          CHOICE {
       sl-MappedQoS-FlowsList-r16
                                              SEQUENCE (SIZE (1..maxNrofSL-QFIs-r16)) OF SL-QoS-Profile-r16,
                                              SL-MappedOoS-FlowsListDedicated-r16
       sl-MappedOoS-FlowsListDedicated-r16
                                                                                                            OPTIONAL, -- Need M
                                         ENUMERATED {broadcast, groupcast, unicast, spare1}
   sl-CastType-r16
                                                                                                           OPTIONAL, -- Need M
SL-MappedOoS-FlowsListDedicated-r16 ::= SEOUENCE {
    sl-MappedOoS-FlowsToAddList-r16 SEOUENCE (SIZE (1..maxNrofSL-OFIs-r16)) OF SL-QoS-FlowIdentity-r16 OPTIONAL,
    sl-MappedOoS-FlowsToReleaseList-r16 SEOUENCE (SIZE (1..maxNrofSL-OFIs-r16)) OF SL-OoS-FlowIdentity-r16 OPTIONAL
                                                                                                                      -- Need N
-- TAG-SL-SDAP-CONFIG-STOP
-- ASN1STOP
```

SL-SDAP-Config field descriptions

sl-DefaultRB

Indicates whether or not this is the default sidelink DRB for this NR sidelink communication transmission destination. Among all configured instances of *SL-SDAP-Config* for this destination, this field shall be set to *true* in at most one instance of *SL-SDAP-Config* and to *false* in all other instances.

sI-MappedQoS-Flows

Indicates QoS flows to be mapped to the sidelink DRB. If the field is included in dedicated signalling, it is set to sl-MappedQoS-FlowsListDedicated; otherwise, it is set to sl-MappedQoS-FlowsList.

sI-MappedQoS-FlowsList

Indicates the list of QoS profiles of the NR sidelink communication transmission destination mapped to this sidelink DRB.

sl-MappedQoS-FlowsToAddList

Indicates the list of SL QoS flows ID of the NR sidelink communication transmission destination to be additionally mapped to this sidelink DRB.

sl-MappedQoS-FlowsToReleaseList

Indicates the list of SL QoS flows ID of the NR sidelink communication transmission destination to be released from existing QoS flow to SLRB mapping of this sidelink DRB.

sI-SDAP-Header

Indicates whether or not a SDAP header is present on this sidelink DRB. The field cannot be changed after a sidelink DRB is established. This field is set to present if the field sl-DefaultRB is set to true.

SL-ServingCellInfo

The IE *SL-ServingCellInfo* is used to indicate the L2 U2N Relay UE's PCell/camping cell, which is considered as PCell/camping cell by the L2 U2N Remote UEs connecting with this L2 U2N Relay UE.

SL-ServingCellInfo information element

```
-- ASN1START
-- TAG-SL-SERVINGCELLINFO-START

SL-ServingCellInfo-r17 ::= SEQUENCE {
    sl-PhysCellId-r17 PhysCellId,
    sl-CarrierFreqNR-r17 ARFCN-ValueNR
}

-- TAG-SL-SERVINGCELLINFO-STOP
-- ASN1STOP
```

SL-ServingCellInfo field descriptions

sI-CarrierFreqNR

Indicates the DL frequency of the cell indicated by sl-PhysCellId.

sl-PhysCellId

Indicates the PCI of the PCell.

SL-SourceIdentity

The IE SL-SourceIdentity is used to identify a source of a NR sidelink communication.

SL-Sourceldentity information element

```
-- ASN1START
-- TAG-SL-SOURCEIDENTITY-START

SL-SourceIdentity-r17 ::= BIT STRING (SIZE (24))
-- TAG-SL-SOURCEIDENTITY-STOP
-- ASN1STOP
```

SL-SRAP-Config

The IE SL-SRAP-Config is used to set the configurable SRAP parameters used by L2 U2N Relay UE and L2 U2N Remote UE as specified in TS 38.351 [66].

SL-SRAP-Config information element

```
-- ASN1START
-- TAG-SL-SRAP-CONFIG-START
SL-SRAP-Config-r17 ::=
                                        SEQUENCE {
    sl-LocalIdentity-r17
                                            INTEGER (0..255)
                                                                                                              OPTIONAL, -- Need M
    sl-MappingToAddModList-r17
                                            SEQUENCE (SIZE (1..maxLC-ID)) OF SL-MappingToAddMod-r17
                                                                                                              OPTIONAL, -- Need N
    sl-MappingToReleaseList-r17
                                            SEQUENCE (SIZE (1..maxLC-ID)) OF SL-RemoteUE-RB-Identity-r17
                                                                                                              OPTIONAL, -- Need N
    . . .
SL-MappingToAddMod-r17 ::=
                                        SEOUENCE {
    sl-RemoteUE-RB-Identity-r17
                                            SL-RemoteUE-RB-Identity-r17,
    sl-EgressRLC-ChannelUu-r17
                                            Uu-RelayRLC-ChannelID-r17
                                                                                                              OPTIONAL, -- Cond L2RelayUE
                                            SL-RLC-ChannelID-r17
    sl-EgressRLC-ChannelPC5-r17
                                                                                                              OPTIONAL, -- Need N
    . . .
SL-RemoteUE-RB-Identity-r17 ::=
                                        CHOICE {
                                            INTEGER (0..3),
    srb-Identity-r17
   drb-Identity-r17
                                            DRB-Identity,
-- TAG-SL-SRAP-CONFIG-STOP
-- ASN1STOP
```

SL-SRAP-Config field descriptions

sl-LocalIdentity

Indicates the local UE ID of the L2 U2N Remote UE used in SRAP as specified in TS 38.351 [66].

sl-MappingToAddModList

Indicates the list of mapping between the bearer identity of the L2 U2N Remote UE and the egress RLC channel as specified in TS 38.351 [66].

sl-MappingToReleaseList

Indicates the list of mapping to be released.

sI-RemoteUE-RB-Identity

Identity of the end-to-end Uu bearer identity of the L2 U2N Remote UE. The value 3 for the field *srb-identity-r17* (i.e., for configuring SRB3) is not supported in this version of the specification.

sl-EgressRLC-ChannelUu

Indicates the egress RLC channel on Uu Hop.

sl-EgressRLC-ChannelPC5

Indicates the egress RLC channel on PC5 Hop.

Conditional Presence	Explanation
L2RelayUE	For L2 U2N Relay UE, the field is optionally present, Need M. Otherwise, it is absent.

SL-SyncConfig

-- ASN1STOP

The IE *SL-SyncConfig* specifies the configuration information concerning reception of synchronisation signals from neighbouring cells as well as concerning the transmission of synchronisation signals for sidelink communication.

SL-SyncConfig information element

```
-- ASN1START
-- TAG-SL-SYNCCONFIG-START
                                  SEQUENCE (SIZE (1..maxSL-SyncConfig-r16)) OF SL-SyncConfig-r16
SL-SyncConfigList-r16 ::=
SL-SyncConfig-r16 ::=
                                   SEOUENCE {
    sl-SyncRefMinHyst-r16
                                      ENUMERATED {dB0, dB3, dB6, dB9, dB12}
                                                                                                               OPTIONAL,
                                                                                                                            -- Need R
    sl-SyncRefDiffHyst-r16
                                       ENUMERATED {dB0, dB3, dB6, dB9, dB12, dBinf}
                                                                                                               OPTIONAL,
                                                                                                                            -- Need R
                                      FilterCoefficient
    sl-filterCoefficient-r16
                                                                                                               OPTIONAL,
                                                                                                                           -- Need R
    sl-SSB-TimeAllocation1-r16
                                       SL-SSB-TimeAllocation-r16
                                                                                                               OPTIONAL,
                                                                                                                            -- Need R
                                                                                                                            -- Need R
    sl-SSB-TimeAllocation2-r16
                                       SL-SSB-TimeAllocation-r16
                                                                                                               OPTIONAL.
    sl-SSB-TimeAllocation3-r16
                                      SL-SSB-TimeAllocation-r16
                                                                                                               OPTIONAL,
                                                                                                                            -- Need R
    sl-SSID-r16
                                      INTEGER (0..671)
                                                                                                               OPTIONAL,
                                                                                                                            -- Need R
    txParameters-r16
                                      SEQUENCE {
                                          SL-RSRP-Range-r16
       syncTxThreshIC-r16
                                                                                                               OPTIONAL,
                                                                                                                           -- Need R
       syncTxThreshOoC-r16
                                          SL-RSRP-Range-r16
                                                                                                               OPTIONAL,
                                                                                                                            -- Need R
       syncInfoReserved-r16
                                          BIT STRING (SIZE (2))
                                                                                                               OPTIONAL
                                                                                                                            -- Need R
    gnss-Sync-r16
                                      ENUMERATED {true}
                                                                                                               OPTIONAL,
                                                                                                                           -- Need R
SL-RSRP-Range-r16 ::=
                                       INTEGER (0..13)
SL-SSB-TimeAllocation-r16 ::=
                                      SEQUENCE {
    sl-NumSSB-WithinPeriod-r16
                                          ENUMERATED {n1, n2, n4, n8, n16, n32, n64}
                                                                                                                            -- Need R
                                                                                                               OPTIONAL,
    sl-TimeOffsetSSB-r16
                                          INTEGER (0..1279)
                                                                                                               OPTIONAL,
                                                                                                                            -- Need R
                                                                                                                            -- Need R
    sl-TimeInterval-r16
                                          INTEGER (0..639)
                                                                                                               OPTIONAL
-- TAG-SL-SYNCCONFIG-STOP
```

SL-SyncConfig field descriptions

gnss-Sync

If configured, the synchronization configuration is used for SLSS transmission/reception when the UE is synchronized to GNSS. If not configured, the synchronization configuration is used for SLSS transmission/reception when the UE is synchronized to eNB/gNB.

sI-SyncRefMinHyst

Hysteresis when evaluating a SyncRef UE using absolute comparison.

sI-SyncRefDiffHyst

Hysteresis when evaluating a SyncRef UE using relative comparison.

sl-NumSSB-WithinPeriod

Indicates the number of sidelink SSB transmissions within one sidelink SSB period. The applicable values are related to the subcarrier spacing and frequency as follows:

FR1, SCS = 15 kHz: 1 FR1, SCS = 30 kHz: 1, 2 FR1, SCS = 60 kHz: 1, 2, 4

FR2, SCS = 60 kHz: 1, 2, 4, 8, 16, 32

FR2, SCS = 120 kHz: 1, 2, 4, 8, 16, 32, 64

sI-TimeOffsetSSB

Indicates the slot offset from the start of sidelink SSB period to the first sidelink SSB.

sl-TimeInterval

Indicates the slot interval between neighboring sidelink SSBs. This value is applicable when there are more than one sidelink SSBs within one sidelink SSB period.

sI-SSID

Indicates the ID of sidelink synchronization signal associated with different synchronization priorities.

syncInfoReserved

Reserved for future use.

syncTxThreshIC, syncTxThreshOoC

Indicates the thresholds used while in coverage and out of coverage, respectively. Value 0 corresponds to -infinity, value 1 to -115 dBm, value 2 to -110 dBm, and so on (i.e. in steps of 5 dBm) until value 12, which corresponds to -60 dBm, while value 13 corresponds to +infinity.

SL-Thres-RSRP-List

IE *SL-Thres-RSRP-List* indicates a threshold used for sensing based UE autonomous resource selection (see TS 38.215 [9]). A resource is excluded if it is indicated or reserved by a decoded SCI and PSSCH/PSCCH RSRP in the associated data resource is above the threshold defined by IE *SL-Thres-RSRP-List*. Value 0 corresponds to minus infinity dBm, value 1 corresponds to -128dBm, value 2 corresponds to -126dBm, value n corresponds to (-128 + (n-1)*2) dBm and so on, value 66 corresponds to infinity dBm.

SL-Thres-RSRP-List information element

```
-- ASN1START
-- TAG-SL-THRES-RSRP-LIST-START

SL-Thres-RSRP-List-r16 ::= SEQUENCE (SIZE (64)) OF SL-Thres-RSRP-r16

SL-Thres-RSRP-r16 ::= INTEGER (0..66)

-- TAG-SL-THRES-RSRP-LIST-STOP
-- ASN1STOP
```

- SL-TxPower

The IE SL-TxPower is used to limit the UE's sidelink transmission power on a carrier frequency. The unit is dBm. Value minusinfinity corresponds to –infinity.

SL-TxPower information element

```
-- ASN1START
-- TAG-SL-TXPOWER-START

SL-TXPOWER-r16 ::= CHOICE{
    minusinfinity-r16 NULL,
    txPower-r16 INTEGER (-30..33)
}

-- TAG-SL-TXPOWER-STOP
-- ASN1STOP
```

SL-TypeTxSync

The IE *SL-TypeTxSync* indicates the synchronization reference type.

SL-TypeTxSync information element

```
-- ASN1START
-- TAG-SL-TYPETXSYNC-START

SL-TypeTxSync-r16 ::= ENUMERATED {gnss, gnbEnb, ue}

-- TAG-SL-TYPETXSYNC-STOP
-- ASN1STOP
```

SL-UE-SelectedConfig

IE SL-UE-SelectedConfig specifies sidelink communication configurations used for UE autonomous resource selection.

SL-UE-SelectedConfig information element

```
-- ASN1START
-- TAG-SL-UE-SELECTEDCONFIG-START
SL-UE-SelectedConfig-r16 ::=
                                            SEQUENCE {
   sl-PSSCH-TxConfigList-r16
                                               SL-PSSCH-TxConfigList-r16
                                                                                                          OPTIONAL,
                                                                                                                      -- Need R
                                               ENUMERATED {v0, v0dot2, v0dot4, v0dot6, v0dot8}
   sl-ProbResourceKeep-r16
                                                                                                          OPTIONAL, -- Need R
                                               ENUMERATED {n1, n2, n3, n4, n5, n6, n7, n8, n9}
   sl-ReselectAfter-r16
                                                                                                          OPTIONAL,
                                                                                                                      -- Need R
   sl-CBR-CommonTxConfigList-r16
                                               SL-CBR-CommonTxConfigList-r16
                                                                                                          OPTIONAL,
                                                                                                                      -- Need R
   ul-PrioritizationThres-r16
                                               INTEGER (1..16)
                                                                                                          OPTIONAL,
                                                                                                                       -- Need R
```

-- Need R

OPTIONAL,

```
sl-PrioritizationThres-r16
...
}
-- TAG-SL-UE-SELECTEDCONFIG-STOP
-- ASN1STOP
```

SL-UE-SelectedConfig field descriptions

sl-PrioritizationThres

Indicates the SL priority threshold, which is used to determine whether SL TX is prioritized over UL TX, as specified in TS 38.321 [3]. Network does not configure the *sl- PrioritizationThres* and the *ul-PrioritizationThres* to the UE separately.

sl-ProbResourceKeep

Indicates the probability with which the UE keeps the current resource when the resource reselection counter reaches zero for sensing based UE autonomous resource selection (see TS 38.321 [3]).

sI-PSSCH-TxConfigList

Indicates PSSCH TX parameters such as MCS, sub-channel number, retransmission number, associated to different UE absolute speeds and different synchronization reference types for UE autonomous resource selection.

sl-ReselectAfter

Indicates the number of consecutive skipped transmissions before triggering resource reselection for sidelink communication (see TS 38.321 [3]).

INTEGER (1..8)

ul-PrioritizationThres

Indicates the UL priority threshold, which is used to determine whether SL TX is prioritized over UL TX, as specified in TS 38.321 [3]. Network does not configure the *sl-PrioritizationThres* and the *ul-PrioritizationThres* to the UE separately.

SL-ZoneConfig

The IE *SL-ZoneConfig* is used to configure the zone ID related parameters.

SL-ZoneConfig information element

SL-ZoneConfig field descriptions

sl-ZoneLength

Indicates the length of each geographic zone.

SLRB-Uu-ConfigIndex

The IE SLRB-Uu-ConfigIndex is used to identify a sidelink DRB configuration from the network side.

SLRB-Uu-ConfigIndex information element

```
-- ASN1START
-- TAG-SLRB-UU-CONFIGINDEX-START

SLRB-Uu-ConfigIndex-r16 ::= INTEGER (1..maxNrofSLRB-r16)
-- TAG-SLRB-UU-CONFIGINDEX-STOP
-- ASN1STOP
```

6.3.6 MBS information elements

CarrierFreqListMBS

The IE CarrierFreqListMBS is used to inform network of the frequencies on which the UE is receiving or interested to receive MBS broadcast service via a broadcast MRB.

CarrierFreqListMBS information element

```
-- ASN1START
-- TAG-CARRIERFREQLISTMBS-START

CarrierFreqListMBS-r17 ::= SEQUENCE (SIZE (1..maxFreqMBS-r17)) OF ARFCN-ValueNR
-- TAG-CARRIERFREQLISTMBS-STOP
-- ASN1STOP
```

CFR-ConfigMCCH-MTCH

The IE CFR-ConfigMCCH-MTCH is used to configure the common frequency resource used for MCCH and MTCH reception.

CFR-ConfigMCCH-MTCH information element

CFR-ConfigMCCH-MTCH field descriptions

commonControlResourceSetExt

An additional common control resource set which may be configured and used for searchSpaceMCCH/searchSpaceMTCH or UE-specific search space in the BWP where searchSpaceMCCH is configured. It is contained in the bandwidth of locationAndBandwidthBroadcast.

IocationAndBandwidthBroadcast

Indicates starting PRB and the number of PRBs of CFR used for MCCH and MTCH reception.

Value sameAsSib1ConfiguredLocationAndBW means the CFR for broadcast has the same location and size as the locationAndBandwidth for initial BWP configured in SIB1. Value locationAndBandwidth is used to configure CFR with bandwidth that is larger than and fully contains the bandwidth for the initial DL BWP and CORESET#0 configured in SIB1.

If the field is absent, the CFR for broadcast has the same location and size as CORESET0.

pdsch-ConfigMCCH

Indicates PDSCH parameters used for MCCH transmission. If the field is absent, PDSCH paramers used for MCCH are the same as those of PDSCH configuration provided in initialDownlinkBWP in SIB1.

Conditional Presence	Explanation
NotSIB1CommonControlResource	The field is optional present in case commonControlResourceSet is not configured in SIB1, Need R, otherwise it is absent.

- DRX-ConfigPTM

The IE DRX-Config-PTM is used to configure DRX related parameters for PTM transmission as specified in TS 38.321 [3].

DRX-Config-PTM information element

```
-- ASN1START
-- TAG-DRX-CONFIGPTM-START
DRX-ConfigPTM-r17 ::=
                                  SEOUENCE {
    drx-onDurationTimerPTM-r17
                                      CHOICE {
        subMilliSeconds
                                          INTEGER (1..31),
                                          ENUMERATED {
       milliSeconds
           ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60,
           ms80, ms100, ms200, ms300, ms400, ms500, ms600, ms800, ms1000, ms1200,
           ms1600, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1
    drx-InactivityTimerPTM-r17
                                      ENUMERATED {
           ms0, ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60, ms80,
           ms100, ms200, ms300, ms500, ms750, ms1280, ms1920, ms2560, spare9, spare8,
```

```
spare7, spare6, spare5, spare4, spare3, spare2, spare1
    drx-HARO-RTT-TimerDL-PTM-r17
                                      INTEGER (0..56)
                                                                           OPTIONAL, -- Cond HAROFeedback
    drx-RetransmissionTimerDL-PTM-r17 ENUMERATED {
           s10, s11, s12, s14, s16, s18, s116, s124, s133, s140, s164, s180, s196, s1112, s1128,
           sl160, sl320, spare15, spare14, spare13, spare12, spare11, spare10, spare9,
           spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1
                                                                           OPTIONAL, -- Cond HAROFeedback
    drx-LongCycleStartOffsetPTM-r17    CHOICE {
       ms10
                                          INTEGER(0..9),
       ms20
                                          INTEGER(0..19),
       ms32
                                          INTEGER(0..31),
       ms40
                                          INTEGER(0..39),
        ms60
                                          INTEGER(0..59),
        ms64
                                          INTEGER(0..63),
       ms70
                                          INTEGER(0..69),
        ms80
                                          INTEGER(0..79),
       ms128
                                          INTEGER(0..127),
       ms160
                                          INTEGER(0..159),
       ms256
                                          INTEGER(0..255),
       ms320
                                          INTEGER(0..319),
       ms512
                                          INTEGER(0..511),
       ms640
                                          INTEGER(0..639),
       ms1024
                                          INTEGER(0..1023),
       ms1280
                                          INTEGER(0..1279),
       ms2048
                                          INTEGER(0..2047),
       ms2560
                                          INTEGER(0..2559),
       ms5120
                                          INTEGER(0..5119),
       ms10240
                                          INTEGER(0..10239)
    drx-SlotOffsetPTM-r17
                                         INTEGER (0..31)
-- TAG-DRX-CONFIGPTM-STOP
-- ASN1STOP
```

DRX-Config-PTM field descriptions

drx-HARQ-RTT-Timer-DL-PTM

Value in number of symbols of the CFR where the transport block was received.

drx-InactivityTimerPTM

Value in multiple integers of 1 ms. ms0 corresponds to 0, ms1 corresponds to 1 ms, ms2 corresponds to 2 ms, and so on.

drx-LongCycleStartOffsetPTM

drx-LongCycle-PTM in ms and drx-StartOffset-PTM in multiples of 1 ms.

drx-onDurationTimerPTM

Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSecond). For the latter, value ms1 corresponds to 1 ms, value ms2 corresponds to 2 ms, and so on.

drx-RetransmissionTimer-DL-PTM

Value in number of slot lengths of the CFR where the transport block was received. value sl0 corresponds to 0 slots, sl1 corresponds to 1 slot, sl2 corresponds to 2 slots, and so on.

drx-SlotOffsetPTM

Value in 1/32 ms. Value 0 corresponds to 0 ms, value 1 corresponds to 1/32 ms, value 2 corresponds to 2/32 ms, and so on.

Conditional Presence	Explanation
HARQFeedback	The field is mandatory present if HARQ feedback is enabled for a G-RNTI/G-CS-RNTI associated with this DRX
	configuration. It is absent otherwise.

MBS-NeighbourCellList

The IE MBS-NeighbourCellList indicates a list of neighbour cells where ongoing MBS sessions provided via broadcast MRB in the current cell are also provided.

MBS-NeighbourCellList information element

MBS-NeighbourCellList field descriptions

carrierFrea

Indicates the frequency of the neighbour cell indicated by phys CellId. Absence of the IE means that the neighbour cell is on the same frequency as the current cell.

MBS-ServiceList

The IE MBS- ServiceList is used to inform the network of the MBS services that the UE is receiving or interested to receive.

MBS-ServiceList information element

MBS-SessionInfoList

The IE MBS-SessionInfoList provides the list of ongoing MBS broadcast sessions transmitted via broadcast MRB and, for each MBS broadcast session, the associated G-RNTI and scheduling information.

MBS-SessionInfoList information element

```
-- ASN1START
-- TAG-MBS-SESSIONINFOLIST-START
MBS-SessionInfoList-r17 ::=
                                SEQUENCE (SIZE (1..maxNrofMBS-Session-r17)) OF MBS-SessionInfo-r17
MBS-SessionInfo-r17 ::=
                                 SEQUENCE {
    mbs-SessionId-r17
                                    TMGI-r17,
   q-RNTI-r17
                                    RNTI-Value,
   mrb-ListBroadcast-r17
                                    MRB-ListBroadcast-r17,
   mtch-SchedulingInfo-r17
                                    DRX-ConfigPTM-Index-r17
                                                                                  OPTIONAL, -- Need S
                                                                                  OPTIONAL, -- Need S
   mtch-NeighbourCell-r17
                                    BIT STRING (SIZE(maxNeighCellMBS-r17))
    pdsch-ConfigIndex-r17
                                    PDSCH-ConfigIndex-r17
                                                                                  OPTIONAL, -- Need S
    mtch-SSB-MappingWindowIndex-r17 MTCH-SSB-MappingWindowIndex-r17
                                                                                  OPTIONAL -- Cond MTCH-Mapping
DRX-ConfigPTM-Index-r17 ::=
                                     INTEGER (0..maxNrofDRX-ConfigPTM-1-r17)
PDSCH-ConfigIndex-r17 ::=
                                     INTEGER (0..maxNrofPDSCH-ConfigPTM-1-r17)
MTCH-SSB-MappingWindowIndex-r17 ::= INTEGER (0..maxNrofMTCH-SSB-MappingWindow-1-r17)
MRB-ListBroadcast-r17 ::=
                                     SEQUENCE (SIZE (1...maxNrofMRB-Broadcast-r17)) OF MRB-InfoBroadcast-r17
MRB-InfoBroadcast-r17 ::=
                                     SEQUENCE {
```

-- ASN1STOP

```
pdcp-Config-r17
                                         MRB-PDCP-ConfigBroadcast-r17,
   rlc-Config-r17
                                         MRB-RLC-ConfigBroadcast-r17,
MRB-PDCP-ConfigBroadcast-r17 ::=
                                     SEQUENCE {
    pdcp-SN-SizeDL-r17
                                         ENUMERATED {len12bits}
                                                                                  OPTIONAL, -- Need S
                                         CHOICE {
    headerCompression-r17
       notUsed
                                             NULL,
       rohc
                                             SEQUENCE {
           maxCID-r17
                                                 INTEGER (1..16)
                                                                               DEFAULT 15,
           profiles-r17
                                                 SEQUENCE {
                profile0x0000-r17
                                                     BOOLEAN,
                profile0x0001-r17
                                                     BOOLEAN,
                profile0x0002-r17
                                                     BOOLEAN
    t-Reordering-r17
                                         ENUMERATED {ms1, ms10, ms40, ms160, ms500, ms1000, ms1250, ms2750}
                                                                                                               OPTIONAL -- Need S
                                     SEQUENCE {
MRB-RLC-ConfigBroadcast-r17 ::=
    logicalChannelIdentity-r17
                                         LogicalChannelIdentity,
    sn-FieldLength-r17
                                         ENUMERATED {size6}
                                                                                  OPTIONAL, -- Need S
    t-Reassembly-r17
                                         T-Reassembly
                                                                                  OPTIONAL -- Need S
-- TAG-MBS-SESSIONINFOLIST-STOP
```

MBS-SessionInfoList field descriptions

g-RNTI

G-RNTI used to scramble the scheduling and transmission of MTCH.

headerCompression

If rohc is configured, the UE shall apply the configured ROHC profile(s) in downlink.

mbs-SessionId

Indicates an identifier of the MBS session provided by the MTCH.

mrb-listBroadcast

A list of broadcast MRBs to which the associated broadcast MBS session is mapped to.

mtch-neiahbourCell

Indicates neighbour cells which provide this service on MTCH. The first bit is set to 1 if the service is provided on MTCH in the first cell in *mbs-NeighbourCellList*, otherwise it is set to 0. The second bit is set to 1 if the service is provided on MTCH in the second cell in *mbs-NeighbourCellList*, and so on. If the service is not available in any neighbouring cell and *mbs-NeighbourCellList* is signalled, the network sets all bits in this field to 0. If this field is absent, the related service may or may not be available in any neighbouring cell, i.e. the UE cannot determine the presence or absence of an MBS service in neighbouring cells based on the absence of this field.

mtch-schedulingInfo

Indicates the index of DRX configuration entry in *drx-ConfigPTM-List* that is used for scheduling the MTCH. The value 0 corresponds to the first entry in *drx-ConfigPTM-List*, the value 1 corresponds to the second entry in *drx-ConfigPTM-List* and so on. In case *mtch-schedulingInfo* is absent for a G-RNTI (i.e. no PTM DRX), the UE shall monitor for PDCCH scrambled with G-RNTI in any slot according to the search space configured for MTCH [see TS 38.213 [13], clause 10.1].

mtch-SSB-MappingWindowIndex

Indicates the index of MTCH-SSB-MappingWindowCycleOffset configuration entry in MTCH-SSB-MappingWindowList. The value 0 corresponds to the first entry in MTCH-SSB-MappingWindowList, the value 1 corresponds to the second entry in MTCH-SSB-MappingWindowList and so on. This field is set to the same value for all MBS sessions mapped to the same G-RNTI.

pdcp-SN-SizeDL

Indicates that PDCP sequence number size of 12 bits is used, as specified in TS 38.323 [5]. When the field is absent the UE applies the value as specified in 9.1.1.7.

pdschConfigIndex

Indicates the index of PDSCH configuration entry in *pdschConfigList* for MTCH. Value 0 corresponds to the first entry in *pdschConfigList*, the value 1 corresponds to the second entry in *pdschConfigList* and so on. When the field is absent the UE applies the first entry in pdschConfigList for MTCH.

sn-FieldLength

Indicates that the RLC SN field size of 6 bits is used, see TS 38,322 [4]. When the field is absent the UE applies the value as specified in 9.1.1.7.

t-Reassembly

Timer for reassembly in TS 38.322 [4], in milliseconds. Value ms0 means 0 ms, value ms5 means 5 ms and so on. When the field is absent the UE applies the value in specified in 9.1.1.7.

t-Reordering

Value in ms of t-Reordering specified in TS 38.323 [5]. Value ms1 corresponds to 1 ms, value ms10 corresponds to 10 ms, and so on. When the field is absent the UE applies the value as specified in 9.1.1.7.

Conditional Presence	Explanation
MTCH-Mapping	The field is mandatory present if the number of actual transmitted SSBs determined according to ssb-PositionsInBurst in
	SIB1 is more than 1, and searchspaceMTCH is not set to zero (including the case where searchSpaceMTCH is absent and
	searchSpaceMCCH is not set to zero). Otherwise, it is absent, Need R.

MTCH-SSB-MappingWindowList

The IE MTCH-SSB-MappingWindowList is used to configure MTCH PDCCH ocassions to SSB mapping window related periodic and offset parameters.

MTCH-SSB-MappingWindowList information element

```
-- ASN1START
-- TAG-MTCH-SSB-MAPPINGWINDOWLIST-START
MTCH-SSB-MappingWindowList-r17 ::= SEQUENCE (SIZE (1..maxNrofMTCH-SSB-MappingWindow-r17)) OF MTCH-SSB-MappingWindowCycleOffset-r17
MTCH-SSB-MappingWindowCycleOffset-r17 ::= CHOICE {
                                               INTEGER (0..9),
    ms10
    ms20
                                               INTEGER(0..19),
    ms32
                                               INTEGER (0..31),
    ms64
                                               INTEGER(0..63),
    ms128
                                               INTEGER (0..127),
    ms256
                                               INTEGER (0..255)
-- TAG-MTCH-SSB-MAPPINGWINDOWLIST-STOP
-- ASN1STOP
```

MTCH-SSB-MappingWindowList field descriptions

MTCH-SSB-MappingWindowCycleOffset

Indicates the *cycle* and *offset* for MTCH PDCCH ocassions to SSB mapping. Values in unit of ms. *ms10* corresponds to cycle of 10 ms with corresponding offset between 0 and 9 ms, value *ms20* corresponds to cycle of 20 ms with corresponding offset between 0 and 19 ms, and so on. The mapping window starts at a subframe in a SFN where [(SFN number × 10) + subframe number] modulo (*cycle*) = *offset*.

PDCCH monitoring occasions for MTCH in a mapping window which are not overlapping with UL symbols (determined according to *tdd-UL-DL-ConfigurationCommon*) are sequentially numbered starting from 1 in the maping window. The [xxN+K]th PDCCH monitoring occasion for MTCH in this mapping window corresponds to the Kth transmitted SSB, where x = 0, 1, ...X-1, K = 1, 2, ...N, N is the number of actual transmitted SSBs determined according to *ssb-PositionsInBurst* in *SIB1* and X is equal to CEIL(number of PDCCH monitoring occasions in MTCH to SSB mapping transmission window/N). The actual transmitted SSBs are sequentially numbered from one in ascending order of their SSB indexes.

– PDSCH-ConfigBroadcast

The IE PDSCH-ConfigBroadcast is used to configure parameters for acquiring the PDSCH for MCCH and MTCH.

PDSCH-ConfigBroadcast information element

```
lte-CRS-ToMatchAround-r17
                                          RateMatchPatternLTE-CRS
                                                                                                             OPTIONAL, -- Need R
   mcs-Table-r17
                                          ENUMERATED {gam256, gam64LowSE}
                                                                                                             OPTIONAL. -- Need S
                                          ENUMERATED (x0h6, x0h12, x0h18)
   xOverhead-r17
                                                                                                             OPTIONAL -- Need S
PDSCH-ConfigPTM-r17 ::= SEQUENCE {
                                          INTEGER (0..1023)
INTEGER (0..65535)
    dataScramblingIdentityPDSCH-r17
                                                                   OPTIONAL. -- Need S
    dmrs-ScramblingID0-r17
                                                                   OPTIONAL, -- Need S
                                          ENUMERATED {n2, n4, n8} OPTIONAL -- Need S
   pdsch-AggregationFactor-r17
-- TAG-PDSCH-CONFIGBROADCAST-STOP
-- ASN1STOP
```

PDSCH-ConfigBroadcast field descriptions

Ite-CRS-ToMatchAround

Parameters to determine an LTE CRS pattern that the UE shall rate match around.

pdschConfigList

List of PDSCH parameters which can be configured per G-RNTI. Only one entity is allowed to be configured if included in SIB20.

pdsch-TimeDomainAllocationList

List of time-domain configurations for timing of DL assignment to DL data.

The field pdsch-TimeDomainAllocationList applies to DCI format 4_0 (see table 5.1.2.1.1-1 in TS 38.214 [19]). When the field is absent, the UE follows PDSCH time domain resource allocation determination rule as specified in TS 38.214 [19], clause 5.1.2.1.1.

rateMatchPatternToAddModList

Resources patterns which the UE should rate match PDSCH around. The UE rate matches around the union of all resources indicated in the rate match patterns (see TS 38.214 [19], clause 5.1.4.1).

mcs-Table

Indicates which MCS table the UE shall use for PDSCH. If the field is absent the UE applies the value 64QAM. The field *mcs-Table* applies to DCI format 4_0 with CRC scrambled by MCCH-RNTI/G-RNTI (see TS 38.214 [19], clause 5.1.3.1).

xOverhead

Accounts for an overhead from CSI-RS, CORESET, etc. If the field is absent, the UE applies value xOh0 (see TS 38.214 [19], clause 5.1.3.2).

PDSCH-ConfigPTM field descriptions

dataScramblingIdentityPDSCH

Identifier(s) used to initialize data scrambling (c_init) for PDSCH as specified in TS 38.211 [16], clause 7.3.1.1. When the field is absent the UE applies the value physCellId configured for this serving cell.

dmrs-ScramblingID0

DL DMRS scrambling initialization (see TS 38.211 [16], clause 7.4.1.1.1). When the field is absent the UE applies the value physCellId configured for this serving cell.

pdsch-AggregationFactor

Number of repetitions for dynamic scheduling of MBS broadcast data for MTCH PDSCH (see TS 38.214 [19], clause 5.1.2.1). When the field is absent the UE applies the value 1.

– TMGI

The IE *TMGI* is used to identify the MBS session.

TMGI information element

```
-- ASN1START
-- TAG-TMGI-START

TMGI-r17 ::= SEQUENCE {
    plmn-Id-r17 CHOICE {
        plmn-Index integer (1..maxPLMN),
        explicitValue PLMN-Identity
    },
    serviceId-r17 OCTET STRING (SIZE (3))
}

-- TAG-TMGI-STOP
-- ASN1STOP
```

TMGI field descriptions

serviceld

Uniquely identifies the identity of an MBS service within a PLMN. The field contains octet 3- 5 of the IE Temporary Mobile Group Identity (TMGI) as defined in TS 24.008 [38]. The first octet contains the third octet of the TMGI, the second octet contains the fourth octet of the TMGI and so on.

6.4 RRC multiplicity and type constraint values

Multiplicity and type constraint definitions

```
-- TAG-MULTIPLICITY-AND-TYPE-CONSTRAINT-DEFINITIONS-START
maxAdditionalRACH-r17
                                       INTEGER ::= 256
                                                           -- Maximum number of additional RACH configurations.
maxAI-DCI-PayloadSize-r16
                                       INTEGER ::= 128
                                                            -- Maximum size of the DCI payload scrambled with ai-RNTI
                                                            --Maximum size of the DCI payload scrambled with ai-RNTI minus 1
maxAI-DCI-PayloadSize-1-r16
                                       INTEGER ::= 127
                                       INTEGER ::= 65536 -- Maximum number of DL band combinations
maxBandComb
maxBandsUTRA-FDD-r16
                                       INTEGER ::= 64
                                                           -- Maximum number of bands listed in UTRA-FDD UE caps
                                       INTEGER ::= 65536 -- Maximum value of BH RLC Channel ID
maxBH-RLC-ChannelID-r16
                                                           -- Maximum number of Bluetooth IDs to report
maxBT-IdReport-r16
                                       INTEGER ::= 32
                                                           -- Maximum number of Bluetooth name
maxBT-Name-r16
                                       INTEGER ::= 4
maxCAG-Cell-r16
                                       INTEGER ::= 16
                                                           -- Maximum number of NR CAG cell ranges in SIB3, SIB4
maxTwoPUCCH-Grp-ConfigList-r16
                                       INTEGER ::= 32
                                                           -- Maximum number of supported configuration(s) of {primary PUCCH group
                                                           -- config, secondary PUCCH group config}
                                                           -- Maximum number of supported configuration(s) of {primary PUCCH group
maxTwoPUCCH-Grp-ConfigList-r17
                                       INTEGER ::= 16
                                                            -- config, secondary PUCCH group config} for PUCCH cell switching
maxCBR-Config-r16
                                       INTEGER ::= 8
                                                           -- Maximum number of CBR range configurations for sidelink communication
                                                           -- congestion control
maxCBR-Config-1-r16
                                       INTEGER ::= 7
                                                           -- Maximum number of CBR range configurations for sidelink communication
                                                            -- congestion control minus 1
```

```
maxCBR-Level-r16
                                                            -- Maximum number of CBR levels
                                        INTEGER ::= 16
maxCBR-Level-1-r16
                                        INTEGER ::= 15
                                                            -- Maximum number of CBR levels minus 1
maxCellExcluded
                                        INTEGER ::= 16
                                                            -- Maximum number of NR exclude-listed cell ranges in SIB3. SIB4
maxCellGroupings-r16
                                        INTEGER ::= 32
                                                            -- Maximum number of cell groupings for NR-DC
maxCellHistory-r16
                                        INTEGER ::= 16
                                                            -- Maximum number of visited PCells reported
maxPSCellHistory-r17
                                                            -- Maximum number of visited PSCells across all reported PCells
                                        INTEGER ::= 16
maxCellInter
                                        INTEGER ::= 16
                                                            -- Maximum number of inter-Freq cells listed in SIB4
                                                            -- Maximum number of intra-Freq cells listed in SIB3
maxCellIntra
                                        INTEGER ::= 16
maxCellMeasEUTRA
                                        INTEGER ::= 32
                                                            -- Maximum number of cells in E-IJTRAN
maxCellMeasIdle-r16
                                        INTEGER ::= 8
                                                            -- Maximum number of cells per carrier for idle/inactive measurements
maxCellMeasUTRA-FDD-r16
                                                            -- Maximum number of cells in FDD UTRAN
                                        INTEGER ::= 32
maxCellNTN-r17
                                        INTEGER ::= 4
                                                            -- Maximum number of NTN neighbour cells for which assistance information is
maxCarrierTypePairList-r16
                                        INTEGER ::= 16
                                                            -- Maximum number of supported carrier type pair of (carrier type on which
                                                            -- CSI measurement is performed, carrier type on which CSI reporting is
                                                            -- performed) for CSI reporting cross PUCCH group
                                                            -- Maximum number of NR allow-listed cell ranges in SIB3, SIB4
maxCellAllowed
                                        INTEGER ::= 16
maxEARFCN
                                        INTEGER ::= 262143 -- Maximum value of E-UTRA carrier frequency
maxEUTRA-CellExcluded
                                                            -- Maximum number of E-UTRA exclude-listed physical cell identity ranges
                                        INTEGER ::= 16
maxEIJTRA-NS-Pmax
                                        INTEGER ::= 8
                                                            -- Maximum number of NS and P-Max values per band
maxFeatureCombPreamblesPerRACHResource-r17 INTEGER ::= 256 -- Maximum number of feature combination preambles.
                                                            -- Maximum number of entries for logged measurements
maxLogMeasReport-r16
                                        INTEGER ::= 520
                                                            -- Maximum number of additional frequency bands that a cell belongs to
maxMultiBands
                                        INTEGER ::= 8
maxNARFCN
                                        INTEGER ::= 3279165 -- Maximum value of NR carrier frequency
maxNR-NS-Pmax
                                        INTEGER ::= 8
                                                            -- Maximum number of NS and P-Max values per band
maxFreqIdle-r16
                                                            -- Maximum number of carrier frequencies for idle/inactive measurements
                                        INTEGER ::= 8
maxNrofServingCells
                                        INTEGER ::= 32
                                                            -- Max number of serving cells (SpCells + SCells)
maxNrofServingCells-1
                                                            -- Max number of serving cells (SpCells + SCells) minus 1
                                        INTEGER ::= 31
maxNrofAggregatedCellsPerCellGroup
                                        INTEGER ::= 16
maxNrofAggregatedCellsPerCellGroupMinus4-r16 INTEGER ::= 12
maxNrofDUCells-r16
                                                            -- Max number of cells configured on the collocated IAB-DU
                                        INTEGER ::= 512
maxNrofAppLayerMeas-r17
                                        INTEGER ::= 16
                                                            -- Max number of simultaneous application layer measurements
maxNrofAppLayerMeas-1-r17
                                                            -- Max number of simultaneous application layer measurements minus 1
                                        INTEGER ::= 15
maxNrofAvailabilityCombinationsPerSet-r16 INTEGER ::= 512 -- Max number of AvailabilityCombinationId used in the DCI format 2 5
maxNrofAvailabilityCombinationsPerSet-1-r16 INTEGER ::= 511 -- Max number of AvailabilityCombinationId used in the DCI format 2_5 minus 1
maxNrofIABResourceConfig-r17
                                        INTEGER ::= 65536
                                                           -- Max number of IAB-ResourceConfigID used in MAC CE
maxNrofIABResourceConfig-1-r17
                                                           -- Max number of IAB-ResourceConfigID used in MAC CE minus 1
                                        INTEGER ::= 65535
maxNrofSCellActRS-r17
                                        INTEGER ::= 255
                                                            -- Max number of RS configurations per SCell for SCell activation
maxNrofSCells
                                        INTEGER ::= 31
                                                            -- Max number of secondary serving cells per cell group
maxNrofCellMeas
                                                            -- Maximum number of entries in each of the cell lists in a measurement object
                                        INTEGER ::= 32
maxNrofCRS-IM-InterfCell-r17
                                        INTEGER ::= 8
                                                            -- Maximum number of LTE interference cells for CRS-IM per UE
                                        INTEGER ::= 32
                                                            -- Maximum number of L2 U2N Relay UEs to measure for each measurement object
maxNrofRelayMeas-r17
                                                            -- on sidelink frequency
maxNrofCG-SL-r16
                                        INTEGER ::= 8
                                                            -- Max number of sidelink configured grant
                                                            -- Max number of sidelink configured grant minus 1
maxNrofCG-SL-1-r16
                                        INTEGER ::= 7
maxSL-GC-BC-DRX-OoS-r17
                                        INTEGER ::= 16
                                                            -- Max number of sidelink DRX configurations for NR
                                                            -- sidelink groupcast/broadcast communication
maxNrofSL-RxInfoSet-r17
                                        INTEGER ::= 4
                                                            -- Max number of sidelink DRX configuration sets in sidelink DRX assistant
                                                            -- information
                                                            -- Max number for the (max) number of SS blocks to average to determine cell
maxNrofSS-BlocksToAverage
                                        INTEGER ::= 16
measurement
maxNrofCondCells-r16
                                        INTEGER ::= 8
                                                            -- Max number of conditional candidate SpCells
maxNrofCondCells-1-r17
                                                            -- Max number of conditional candidate SpCells minus 1
                                        INTEGER ::= 7
```

```
INTEGER ::= 16
                                                            -- Max number for the (max) number of CSI-RS to average to determine cell measurement
maxNrofCSI-RS-ResourcesToAverage
maxNrofDL-Allocations
                                        INTEGER ::= 16
                                                            -- Maximum number of PDSCH time domain resource allocations
maxNrofDL-AllocationsExt-r17
                                        INTEGER ::= 64
                                                            -- Maximum number of PDSCH time domain resource allocations for multi-PDSCH
                                                            -- scheduling
maxNrofPDU-Sessions-r17
                                        INTEGER ::= 256
                                                            -- Maximum number of PDU Sessions
                                                            -- Maximum number of SR configurations per cell group
maxNrofSR-ConfigPerCellGroup
                                        INTEGER ::= 8
maxLCG-ID
                                        INTEGER ::= 7
                                                            -- Maximum value of LCG ID
maxLCG-ID-IAB-r17
                                        INTEGER ::= 255
                                                            -- Maximum value of LCG ID for IAB-MT
maxLC-TD
                                        INTEGER ::= 32
                                                            -- Maximum value of Logical Channel ID
                                                            -- Maximum value of BH Logical Channel ID extension
maxLC-ID-Iab-r16
                                        INTEGER ::= 65855
maxLTE-CRS-Patterns-r16
                                                            -- Maximum number of additional LTE CRS rate matching patterns
                                        INTEGER ::= 3
maxNrofTAGs
                                        INTEGER ::= 4
                                                            -- Maximum number of Timing Advance Groups
                                                            -- Maximum number of Timing Advance Groups minus 1
maxNrofTAGs-1
                                        INTEGER ::= 3
maxNrofBWPs
                                        INTEGER ::= 4
                                                            -- Maximum number of BWPs per serving cell
maxNrofCombIDC
                                        INTEGER ::= 128
                                                            -- Maximum number of reported MR-DC combinations for IDC
maxNrofSymbols-1
                                        INTEGER ::= 13
                                                            -- Maximum index identifying a symbol within a slot (14 symbols, indexed from 0..13)
                                        INTEGER ::= 320
                                                            -- Maximum number of slots in a 10 ms period
maxNrofSlots
maxNrofSlots-1
                                        INTEGER ::= 319
                                                            -- Maximum number of slots in a 10 ms period minus 1
                                                            -- Maximum number of PRBs
maxNrofPhysicalResourceBlocks
                                        INTEGER ::= 275
                                                            -- Maximum number of PRBs minus 1
maxNrofPhysicalResourceBlocks-1
                                        INTEGER ::= 274
maxNrofPhysicalResourceBlocksPlus1
                                        INTEGER ::= 276
                                                            -- Maximum number of PRBs plus 1
maxNrofControlResourceSets
                                                            -- Max number of CoReSets configurable on a serving cell
                                        INTEGER ::= 12
maxNrofControlResourceSets-1
                                                            -- Max number of CoReSets configurable on a serving cell minus 1
                                        INTEGER ::= 11
maxNrofControlResourceSets-1-r16
                                                            -- Max number of CoReSets configurable on a serving cell extended in minus 1
                                        INTEGER ::= 15
maxNrofCoresetPools-r16
                                        INTEGER ::= 2
                                                            -- Maximum number of CORESET pools
maxCoReSetDuration
                                        INTEGER ::= 3
                                                            -- Max number of OFDM symbols in a control resource set
maxNrofSearchSpaces-1
                                        INTEGER ::= 39
                                                            -- Max number of Search Spaces minus 1
maxNrofSearchSpacesLinks-1-r17
                                        INTEGER ::= 39
                                                            -- Max number of Search Space links minus 1
maxNrofBFDResourcePerSet-r17
                                                            -- Max number of reference signal in one BFD set
                                        INTEGER ::= 64
                                                            -- Max number payload of a DCI scrambled with SFI-RNTI
maxSFI-DCI-PayloadSize
                                        INTEGER ::= 128
                                                            -- Max number payload of a DCI scrambled with SFI-RNTI minus 1
maxSFI-DCI-PavloadSize-1
                                        INTEGER ::= 127
maxIAB-IP-Address-r16
                                        INTEGER ::= 32
                                                            -- Max number of assigned IP addresses
maxINT-DCI-PayloadSize
                                        INTEGER ::= 126
                                                            -- Max number payload of a DCI scrambled with INT-RNTI
maxINT-DCI-PayloadSize-1
                                                            -- Max number payload of a DCI scrambled with INT-RNTI minus 1
                                        INTEGER ::= 125
maxNrofRateMatchPatterns
                                        INTEGER ::= 4
                                                            -- Max number of rate matching patterns that may be configured
maxNrofRateMatchPatterns-1
                                        INTEGER ::= 3
                                                            -- Max number of rate matching patterns that may be configured minus 1
maxNrofRateMatchPatternsPerGroup
                                        INTEGER ::= 8
                                                            -- Max number of rate matching patterns that may be configured in one group
                                                            -- Maximum number of report configurations
maxNrofCSI-ReportConfigurations
                                        INTEGER ::= 48
                                                            -- Maximum number of report configurations minus 1
maxNrofCSI-ReportConfigurations-1
                                        INTEGER ::= 47
maxNrofCSI-ResourceConfigurations
                                        INTEGER ::= 112
                                                            -- Maximum number of resource configurations
                                                            -- Maximum number of resource configurations minus 1
maxNrofCSI-ResourceConfigurations-1
                                        INTEGER ::= 111
                                        INTEGER ::= 16
maxNrofAP-CSI-RS-ResourcesPerSet
maxNrOfCSI-AperiodicTriggers
                                                            -- Maximum number of triggers for aperiodic CSI reporting
                                        INTEGER ::= 128
maxNrofReportConfigPerAperiodicTrigger
                                                            -- Maximum number of report configurations per trigger state for aperiodic reporting
                                       INTEGER ::= 16
maxNrofNZP-CSI-RS-Resources
                                        INTEGER ::= 192
                                                            -- Maximum number of Non-Zero-Power (NZP) CSI-RS resources
maxNrofNZP-CSI-RS-Resources-1
                                        INTEGER ::= 191
                                                            -- Maximum number of Non-Zero-Power (NZP) CSI-RS resources minus 1
maxNrofNZP-CSI-RS-ResourcesPerSet
                                        INTEGER ::= 64
                                                            -- Maximum number of NZP CSI-RS resources per resource set
maxNrofNZP-CSI-RS-ResourceSets
                                        INTEGER ::= 64
                                                            -- Maximum number of NZP CSI-RS resource sets per cell
maxNrofNZP-CSI-RS-ResourceSets-1
                                        INTEGER ::= 63
                                                            -- Maximum number of NZP CSI-RS resource sets per cell minus 1
                                                            -- Maximum number of resource sets per resource configuration
maxNrofNZP-CSI-RS-ResourceSetsPerConfig INTEGER ::= 16
                                                            -- Maximum number of resources per resource configuration
maxNrofNZP-CSI-RS-ResourcesPerConfig
                                        INTEGER ::= 128
maxNrofZP-CSI-RS-Resources
                                        INTEGER ::= 32
                                                            -- Maximum number of Zero-Power (ZP) CSI-RS resources
maxNrofZP-CSI-RS-Resources-1
                                        INTEGER ::= 31
                                                            -- Maximum number of Zero-Power (ZP) CSI-RS resources minus 1
maxNrofZP-CSI-RS-ResourceSets-1
                                        INTEGER ::= 15
```

```
maxNrofZP-CSI-RS-ResourcesPerSet.
                                        INTEGER ::= 16
maxNrofZP-CSI-RS-ResourceSets
                                        INTEGER ::= 16
maxNrofCSI-IM-Resources
                                        INTEGER ::= 32
                                                            -- Maximum number of CSI-IM resources
maxNrofCSI-IM-Resources-1
                                        INTEGER ::= 31
                                                            -- Maximum number of CSI-IM resources minus 1
maxNrofCSI-IM-ResourcesPerSet
                                        INTEGER ::= 8
                                                            -- Maximum number of CSI-IM resources per set
                                                            -- Maximum number of NZP CSI-IM resource sets per cell
maxNrofCSI-IM-ResourceSets
                                        INTEGER ::= 64
                                                            -- Maximum number of NZP CSI-IM resource sets per cell minus 1
maxNrofCSI-IM-ResourceSets-1
                                        INTEGER ::= 63
maxNrofCSI-IM-ResourceSetsPerConfig
                                        INTEGER ::= 16
                                                            -- Maximum number of CSI IM resource sets per resource configuration
maxNrofCSI-SSB-ResourcePerSet
                                        INTEGER ::= 64
                                                            -- Maximum number of SSB resources in a resource set
                                                            -- Maximum number of CSI SSB resource sets per cell
maxNrofCSI-SSB-ResourceSets
                                        INTEGER ::= 64
maxNrofCSI-SSB-ResourceSets-1
                                                            -- Maximum number of CSI SSB resource sets per cell minus 1
                                        INTEGER ::= 63
maxNrofCSI-SSB-ResourceSetsPerConfig
                                        INTEGER ::= 1
                                                            -- Maximum number of CSI SSB resource sets per resource configuration
                                                            -- Maximum number of CSI SSB resource sets per resource configuration
maxNrofCSI-SSB-ResourceSetsPerConfigExt INTEGER ::= 2
                                                            -- extended
maxNrofFailureDetectionResources
                                                            -- Maximum number of failure detection resources
                                        INTEGER ::= 10
                                                            -- Maximum number of failure detection resources minus 1
maxNrofFailureDetectionResources-1
                                        INTEGER ::= 9
maxNrofFailureDetectionResources-1-r17
                                                            -- Maximum number of the enhanced failure detection resources minus 1
                                       INTEGER ::= 63
maxNrofFregSL-r16
                                        INTEGER ::= 8
                                                            -- Maximum number of carrier frequency for NR sidelink communication
                                                            -- Maximum number of BWP for NR sidelink communication
maxNrofSL-BWPs-r16
                                        INTEGER ::= 4
maxFreqSL-EUTRA-r16
                                        INTEGER ::= 8
                                                            -- Maximum number of EUTRA anchor carrier frequency for NR sidelink communication
maxNrofSL-MeasId-r16
                                        INTEGER ::= 64
                                                            -- Maximum number of sidelink measurement identity (RSRP) per destination
                                                            -- Maximum number of sidelink measurement objects (RSRP) per destination
maxNrofSL-ObjectId-r16
                                        INTEGER ::= 64
                                                            -- Maximum number of sidelink measurement reporting configuration(RSRP) per destination
maxNrofSL-ReportConfigId-r16
                                        INTEGER ::= 64
                                        INTEGER ::= 8
maxNrofSL-PoolToMeasureNR-r16
                                                            -- Maximum number of resource pool for NR sidelink measurement to measure for
                                                            -- each measurement object (for CBR)
maxFreqSL-NR-r16
                                        INTEGER ::= 8
                                                            -- Maximum number of NR anchor carrier frequency for NR sidelink communication
maxNrofSL-OFIs-r16
                                        INTEGER ::= 2048
                                                            -- Maximum number of OoS flow for NR sidelink communication per UE
maxNrofSL-OFIsPerDest-r16
                                        INTEGER ::= 64
                                                            -- Maximum number of OoS flow per destination for NR sidelink communication
                                                            -- Maximum number of measurement objects
maxNrofObjectId
                                        INTEGER ::= 64
                                                            -- Maximum number of page records
maxNrofPageRec
                                        INTEGER ::= 32
maxNrofPCI-Ranges
                                        INTEGER ::= 8
                                                            -- Maximum number of PCI ranges
                                                            -- Maximum number of PLMNs broadcast and reported by UE at establishment
maxPLMN
                                        INTEGER ::= 12
maxTAC-r17
                                        INTEGER ::= 12
                                                            -- Maximum number of Tracking Area Codes to which a cell belongs to
                                                            -- Maximum number of CSI-RS resources per cell for an RRM measurement object
maxNrofCSI-RS-ResourcesRRM
                                        INTEGER ::= 96
maxNrofCSI-RS-ResourcesRRM-1
                                        INTEGER ::= 95
                                                            -- Maximum number of CSI-RS resources per cell for an RRM measurement object
                                                            -- minus 1.
maxNrofMeasId
                                        INTEGER ::= 64
                                                            -- Maximum number of configured measurements
                                                            -- Maximum number of quantity configurations
maxNrofOuantityConfig
                                        INTEGER ::= 2
maxNrofCSI-RS-CellsRRM
                                                            -- Maximum number of cells with CSI-RS resources for an RRM measurement object
                                        INTEGER ::= 96
maxNrofSL-Dest-r16
                                        INTEGER ::= 32
                                                            -- Maximum number of destination for NR sidelink communication and discovery
                                                            -- Highest index of destination for NR sidelink communication and discovery
maxNrofSL-Dest-1-r16
                                        INTEGER ::= 31
                                        INTEGER ::= 512
maxNrofSLRB-r16
                                                            -- Maximum number of radio bearer for NR sidelink communication per UE
                                                            -- Maximum number of RLC bearer for NR sidelink communication per UE
maxSL-LCID-r16
                                        INTEGER ::= 512
                                                            -- Maximum number of sidelink Sync configurations
maxSL-SyncConfig-r16
                                        INTEGER ::= 16
maxNrofRXPool-r16
                                        INTEGER ::= 16
                                                            -- Maximum number of Rx resource pool for NR sidelink communication and
                                                            -- discovery
maxNrofTXPool-r16
                                        INTEGER ::= 8
                                                            -- Maximum number of Tx resource pool for NR sidelink communication and
maxNrofPoolTD-r16
                                        INTEGER ::= 16
                                                            -- Maximum index of resource pool for NR sidelink communication and
maxNrofSRS-PathlossReferenceRS-r16
                                        INTEGER ::= 64
                                                            -- Maximum number of RSs used as pathloss reference for SRS power control.
maxNrofSRS-PathlossReferenceRS-1-r16
                                        INTEGER ::= 63
                                                            -- Maximum number of RSs used as pathloss reference for SRS power control
maxNrofSRS-ResourceSets
                                        INTEGER ::= 16
                                                            -- Maximum number of SRS resource sets in a BWP.
```

```
-- Maximum number of SRS resource sets in a BWP minus 1.
maxNrofSRS-ResourceSets-1
                                        INTEGER ::= 15
maxNrofSRS-PosResourceSets-r16
                                        INTEGER ::= 16
                                                            -- Maximum number of SRS Positioning resource sets in a BWP.
maxNrofSRS-PosResourceSets-1-r16
                                        INTEGER ::= 15
                                                            -- Maximum number of SRS Positioning resource sets in a BWP minus 1.
maxNrofSRS-Resources
                                        INTEGER ::= 64
                                                            -- Maximum number of SRS resources.
maxNrofSRS-Resources-1
                                        INTEGER ::= 63
                                                            -- Maximum number of SRS resources minus 1.
                                                            -- Maximum number of SRS Positioning resources.
maxNrofSRS-PosResources-r16
                                        INTEGER ::= 64
maxNrofSRS-PosResources-1-r16
                                                            -- Maximum number of SRS Positioning resources minus 1.
                                        INTEGER ::= 63
maxNrofSRS-ResourcesPerSet
                                        INTEGER ::= 16
                                                            -- Maximum number of SRS resources in an SRS resource set
maxNrofSRS-TriggerStates-1
                                        INTEGER ::= 3
                                                            -- Maximum number of SRS trigger states minus 1, i.e., the largest code point.
                                                            -- Maximum number of SRS trigger states minus 2.
maxNrofSRS-TriggerStates-2
                                        INTEGER ::= 2
                                                            -- Maximum number of interworking RAT containers (incl NR and MRDC)
maxRAT-CapabilityContainers
                                        INTEGER ::= 8
maxSimultaneousBands
                                        INTEGER ::= 32
                                                            -- Maximum number of simultaneously aggregated bands
                                                            -- Maximum number of band pairs supporting dynamic UL Tx switching in a band
maxULTxSwitchingBandPairs
                                        INTEGER ::= 32
                                                            -- combination.
maxNrofSlotFormatCombinationsPerSet
                                        INTEGER ::= 512
                                                            -- Maximum number of Slot Format Combinations in a SF-Set.
maxNrofSlotFormatCombinationsPerSet-1
                                        INTEGER ::= 511
                                                            -- Maximum number of Slot Format Combinations in a SF-Set minus 1.
                                        INTEGER ::= 8
                                                            -- Maximum number of Traffic Pattern for NR sidelink communication.
maxNrofTrafficPattern-r16
maxNrofPUCCH-Resources
                                        INTEGER ::= 128
maxNrofPUCCH-Resources-1
                                        INTEGER ::= 127
maxNrofPUCCH-ResourceSets
                                        INTEGER ::= 4
                                                            -- Maximum number of PUCCH Resource Sets
maxNrofPUCCH-ResourceSets-1
                                        INTEGER ::= 3
                                                            -- Maximum number of PUCCH Resource Sets minus 1.
maxNrofPUCCH-ResourcesPerSet
                                        INTEGER ::= 32
                                                            -- Maximum number of PUCCH Resources per PUCCH-ResourceSet
maxNrofPUCCH-PO-PerSet
                                        INTEGER ::= 8
                                                            -- Maximum number of P0-pucch present in a p0-pucch set
                                        INTEGER ::= 4
                                                            -- Maximum number of RSs used as pathloss reference for PUCCH power control.
maxNrofPUCCH-PathlossReferenceRSs
maxNrofPUCCH-PathlossReferenceRSs-1
                                        INTEGER ::= 3
                                                            -- Maximum number of RSs used as pathloss reference for PUCCH power control
maxNrofPUCCH-PathlossReferenceRSs-r16
                                                            -- Maximum number of RSs used as pathloss reference for PUCCH power control
                                       INTEGER ::= 64
maxNrofPUCCH-PathlossReferenceRSs-1-r16 INTEGER ::= 63
                                                            -- Maximum number of RSs used as pathloss reference for PUCCH power control
                                                            -- minus 1 extended.
maxNrofPUCCH-PathlossReferenceRSs-1-r17 INTEGER ::= 7
                                                            -- Maximum number of RSs used as pathloss reference for PUCCH power control
                                                            -- minus 1.
maxNrofPUCCH-PathlossReferenceRSsDiff-r16 INTEGER ::= 60
                                                            -- Difference between the extended maximum and the non-extended maximum
                                        INTEGER ::= 4
                                                            -- Maximum number of PUCCH resources groups.
maxNrofPUCCH-ResourceGroups-r16
maxNrofPUCCH-ResourcesPerGroup-r16
                                        INTEGER ::= 128
                                                            -- Maximum number of PUCCH resources in a PUCCH group.
maxNrofPowerControlSetInfos-r17
                                        INTEGER ::= 8
                                                            -- Maximum number of PUCCH power control set infos
maxNrofMultiplePUSCHs-r16
                                        INTEGER ::= 8
                                                            -- Maximum number of multiple PUSCHs in PUSCH TDRA list
maxNrofP0-PUSCH-AlphaSets
                                                            -- Maximum number of P0-pusch-alpha-sets (see TS 38.213 [13], clause 7.1)
                                        INTEGER ::= 30
maxNrofP0-PUSCH-AlphaSets-1
                                                            -- Maximum number of P0-pusch-alpha-sets minus 1 (see TS 38.213 [13], clause 7.1)
                                        INTEGER ::= 29
maxNrofPUSCH-PathlossReferenceRSs
                                        INTEGER ::= 4
                                                            -- Maximum number of RSs used as pathloss reference for PUSCH power control.
                                                            -- Maximum number of RSs used as pathloss reference for PUSCH power control
maxNrofPUSCH-PathlossReferenceRSs-1
                                        INTEGER ::= 3
maxNrofPUSCH-PathlossReferenceRSs-r16
                                                            -- Maximum number of RSs used as pathloss reference for PUSCH power control
                                       INTEGER ::= 64
maxNrofPUSCH-PathlossReferenceRSs-1-r16 INTEGER ::= 63
                                                            -- Maximum number of RSs used as pathloss reference for PUSCH power control
                                                            -- extended minus 1
maxNrofPUSCH-PathlossReferenceRSsDiff-r16 INTEGER ::= 60
                                                            -- Difference between maxNrofPUSCH-PathlossReferenceRSs-r16 and
                                                            -- maxNrofPUSCH-PathlossReferenceRSs
maxNrofPathlossReferenceRSs-r17
                                        INTEGER ::= 64
                                                            -- Maximum number of RSs used as pathloss reference for PUSCH, PUCCH, SRS
                                                            -- power control for unified TCI state operation
maxNrofPathlossReferenceRSs-1-r17
                                                            -- Maximum number of RSs used as pathloss reference for PUSCH, PUCCH, SRS
                                        INTEGER ::= 63
                                                            -- power control for unified TCI state operation minus 1
maxNrofNAICS-Entries
                                        INTEGER ::= 8
                                                            -- Maximum number of supported NAICS capability set
                                                            -- Maximum number of supported bands in UE capability.
maxBands
                                        INTEGER ::= 1024
```

```
maxBandsMRDC
                                        INTEGER ::= 1280
maxBandsEUTRA
                                        INTEGER ::= 256
maxCellReport
                                        INTEGER ::= 8
maxDRB
                                        INTEGER ::= 29
                                                            -- Maximum number of DRBs (that can be added in DRB-ToAddModList).
                                        INTEGER ::= 8
                                                            -- Max number of frequencies.
maxFreq
                                                            -- Max number of frequency layers.
                                        INTEGER ::= 4
maxFreqLayers
                                        INTEGER ::= 9
                                                            -- Max number of frequencies for Slicing.
maxFreqPlus1
maxFreqIDC-r16
                                        INTEGER ::= 128
                                                            -- Max number of frequencies for IDC indication.
maxCombIDC-r16
                                        INTEGER ::= 128
                                                            -- Max number of reported UL CA for IDC indication.
                                                            -- Maximum number of candidate NR frequencies for MR-DC IDC indication
maxFreqIDC-MRDC
                                        INTEGER ::= 32
                                                            -- Max number of PRACH-ResourceDedicatedBFR in BFR config.
maxNrofCandidateBeams
                                        INTEGER ::= 16
maxNrofCandidateBeams-r16
                                        INTEGER ::= 64
                                                            -- Max number of candidate beam resources in BFR config.
maxNrofCandidateBeamsExt-r16
                                                            -- Max number of PRACH-ResourceDedicatedBFR in the CandidateBeamRSListExt
                                        INTEGER ::= 48
maxNrofPCIsPerSMTC
                                        INTEGER ::= 64
                                                            -- Maximum number of PCIs per SMTC.
                                        INTEGER ::= 64
maxNrofOFIs
maxNrofResourceAvailabilityPerCombination-r16 INTEGER ::= 256
                                                            -- Maximum number of triggers for semi persistent reporting on PUSCH
maxNrOfSemiPersistentPUSCH-Triggers
                                        INTEGER ::= 64
maxNrofSR-Resources
                                                            -- Maximum number of SR resources per BWP in a cell.
                                        INTEGER ::= 8
maxNrofSlotFormatsPerCombination
                                        INTEGER ::= 256
maxNrofSpatialRelationInfos
                                        INTEGER ::= 8
maxNrofSpatialRelationInfos-plus-1
                                        INTEGER ::= 9
maxNrofSpatialRelationInfos-r16
                                        INTEGER ::= 64
maxNrofSpatialRelationInfosDiff-r16
                                        INTEGER ::= 56
                                                            -- Difference between maxNrofSpatialRelationInfos-r16 and maxNrofSpatialRelationInfos
maxNrofIndexesToReport
                                        INTEGER ::= 32
maxNrofIndexesToReport2
                                        INTEGER ::= 64
maxNrofSSBs-r16
                                        INTEGER ::= 64
                                                            -- Maximum number of SSB resources in a resource set.
maxNrofSSBs-1
                                                            -- Maximum number of SSB resources in a resource set minus 1.
                                        INTEGER ::= 63
maxNrofS-NSSAI
                                        INTEGER ::= 8
                                                            -- Maximum number of S-NSSAI.
maxNrofTCI-StatesPDCCH
                                        INTEGER ::= 64
                                                            -- Maximum number of TCI states.
maxNrofTCI-States
                                        INTEGER ::= 128
maxNrofTCI-States-1
                                        INTEGER ::= 127
                                                            -- Maximum number of TCI states minus 1.
maxUL-TCI-r17
                                                            -- Maximum number of TCI states.
                                        INTEGER ::= 64
maxUL-TCI-1-r17
                                        INTEGER ::= 63
                                                            -- Maximum number of TCI states minus 1.
maxNrofAdditionalPCI-r17
                                                            -- Maximum number of additional PCI
                                        INTEGER ::= 7
maxMPE-Resources-r17
                                        INTEGER ::= 64
                                                            -- Maximum number of pooled MPE resources
                                        INTEGER ::= 16
maxNrofUL-Allocations
                                                            -- Maximum number of PUSCH time domain resource allocations.
maxOFI
                                        INTEGER ::= 63
maxRA-CSIRS-Resources
                                        INTEGER ::= 96
maxRA-OccasionsPerCSIRS
                                                            -- Maximum number of RA occasions for one CSI-RS
                                        INTEGER ::= 64
maxRA-Occasions-1
                                        INTEGER ::= 511
                                                            -- Maximum number of RA occasions in the system
maxRA-SSB-Resources
                                        INTEGER ::= 64
maxSCSs
                                        INTEGER ::= 5
maxSecondaryCellGroups
                                        INTEGER ::= 3
maxNrofServingCellsEUTRA
                                        INTEGER ::= 32
maxMBSFN-Allocations
                                        INTEGER ::= 8
maxNrofMultiBands
                                        INTEGER ::= 8
maxCellSFTD
                                        INTEGER ::= 3
                                                            -- Maximum number of cells for SFTD reporting
maxReportConfigId
                                        INTEGER ::= 64
maxNrofCodebooks
                                        INTEGER ::= 16
                                                            -- Maximum number of codebooks supported by the UE
                                                            -- Maximum number of codebook resources supported by the UE for eType2/Codebook combo
maxNrofCSI-RS-ResourcesExt-r16
                                        INTEGER ::= 16
                                                            -- Maximum number of codebook resources for fetype2R1 and fetype2R2
maxNrofCSI-RS-ResourcesExt-r17
                                        INTEGER ::= 8
maxNrofCSI-RS-Resources
                                        INTEGER ::= 7
                                                            -- Maximum number of codebook resources supported by the UE
maxNrofCSI-RS-ResourcesAlt-r16
                                        INTEGER ::= 512
                                                            -- Maximum number of alternative codebook resources supported by the UE
                                                            -- Maximum number of alternative codebook resources supported by the UE minus 1
maxNrofCSI-RS-ResourcesAlt-1-r16
                                        INTEGER ::= 511
```

```
INTEGER ::= 16
maxNrofSRI-PUSCH-Mappings
maxNrofSRI-PUSCH-Mappings-1
                                        INTEGER ::= 15
maxSIB
                                        INTEGER::= 32
                                                            -- Maximum number of SIBs
maxSI-Message
                                        INTEGER::= 32
                                                            -- Maximum number of SI messages
maxSIB-MessagePlus1-r17
                                        INTEGER::= 33
                                                            -- Maximum number of SIB messages plus 1
                                                            -- Maximum number of paging occasion per paging frame
maxPO-perPF
                                        INTEGER ::= 4
maxPEI-perPF-r17
                                        INTEGER ::= 4
                                                            -- Maximum number of PEI occasion per paging frame
                                                            -- Maximum number of Access Categories minus 1
maxAccessCat-1
                                        INTEGER ::= 63
maxBarringInfoSet
                                        INTEGER ::= 8
                                                            -- Maximum number of access control parameter sets
                                                            -- Maximum number of E-UTRA cells in SIB list
maxCellEUTRA
                                        INTEGER ::= 8
maxEUTRA-Carrier
                                                            -- Maximum number of E-UTRA carriers in SIB list
                                        INTEGER ::= 8
maxPLMNIdentities
                                        INTEGER ::= 8
                                                            -- Maximum number of PLMN identities in RAN area configurations
maxDownlinkFeatureSets
                                        INTEGER ::= 1024
                                                            -- (for NR DL) Total number of FeatureSets (size of the pool)
maxUplinkFeatureSets
                                        INTEGER ::= 1024
                                                            -- (for NR UL) Total number of FeatureSets (size of the pool)
maxEUTRA-DL-FeatureSets
                                        INTEGER ::= 256
                                                            -- (for E-UTRA) Total number of FeatureSets (size of the pool)
maxEUTRA-UL-FeatureSets
                                        INTEGER ::= 256
                                                            -- (for E-UTRA) Total number of FeatureSets (size of the pool)
                                                            -- (for NR) The number of feature sets associated with one band.
                                        INTEGER ::= 128
maxFeatureSetsPerBand
maxPerCC-FeatureSets
                                        INTEGER ::= 1024
                                                            -- (for NR) Total number of CC-specific FeatureSets (size of the pool)
                                                            -- (for MR-DC/NR) Total number of Feature set combinations (size of the pool)
maxFeatureSetCombinations
                                        INTEGER ::= 1024
maxInterRAT-RSTD-Freq
                                        INTEGER ::= 3
maxGTN-r17
                                        INTEGER ::= 24
                                                            -- Maximum number of broadcast GINs
                                                            -- Maximum length of HRNNs
maxHRNN-Len-r16
                                        INTEGER ::= 48
                                                            -- Maximum number of NPNs broadcast and reported by UE at establishment
maxNPN-r16
                                        INTEGER ::= 12
maxNrOfMinSchedulingOffsetValues-r16
                                        INTEGER ::= 2
                                                            -- Maximum number of min. scheduling offset (K0/K2) configurations
maxK0-SchedulingOffset-r16
                                        INTEGER ::= 16
                                                            -- Maximum number of slots configured as min. scheduling offset (KO)
maxK2-SchedulingOffset-r16
                                        INTEGER ::= 16
                                                            -- Maximum number of slots configured as min. scheduling offset (K2)
maxK0-SchedulingOffset-r17
                                                            -- Maximum number of slots configured as min. scheduling offset (KO)
                                        INTEGER ::= 64
maxK2-SchedulingOffset-r17
                                        INTEGER ::= 64
                                                            -- Maximum number of slots configured as min. scheduling offset (K2)
maxDCI-2-6-Size-r16
                                                            -- Maximum size of DCI format 2-6
                                        INTEGER ::= 140
maxDCI-2-7-Size-r17
                                                            -- Maximum size of DCI format 2-7
                                        INTEGER ::= 43
maxDCT-2-6-Size-1-r16
                                        INTEGER ::= 139
                                                            -- Maximum DCI format 2-6 size minus 1
maxNrofUL-Allocations-r16
                                                            -- Maximum number of PUSCH time domain resource allocations
                                        INTEGER ::= 64
maxNrofP0-PUSCH-Set-r16
                                        INTEGER ::= 2
                                                            -- Maximum number of P0 PUSCH set(s)
maxOnDemandSIB-r16
                                                            -- Maximum number of SIB(s) that can be requested on-demand
                                        INTEGER ::= 8
maxOnDemandPosSIB-r16
                                        INTEGER ::= 32
                                                            -- Maximum number of posSIB(s) that can be requested on-demand
                                        INTEGER ::= 126
maxCI-DCI-PayloadSize-r16
                                                            -- Maximum number of the DCI size for CI
maxCI-DCI-PayloadSize-1-r16
                                        INTEGER ::= 125
                                                            -- Maximum number of the DCI size for CI minus 1
                                                            -- Maximum value of Uu Relay RLC channel ID
maxUu-RelayRLC-ChannelID-r17
                                        INTEGER ::= 32
maxWLAN-Id-Report-r16
                                                            -- Maximum number of WLAN IDs to report
                                        INTEGER ::= 32
maxWLAN-Name-r16
                                        INTEGER ::= 4
                                                            -- Maximum number of WLAN name
                                                            -- Maximum number of RA procedures information to be included in the RA report
maxRAReport-r16
                                        INTEGER ::= 8
maxTxConfig-r16
                                        INTEGER ::= 64
                                                            -- Maximum number of sidelink transmission parameters configurations
maxTxConfig-1-r16
                                                            -- Maximum number of sidelink transmission parameters configurations minus 1
                                        INTEGER ::= 63
maxPSSCH-TxConfig-r16
                                                            -- Maximum number of PSSCH TX configurations
                                        INTEGER ::= 16
maxNrofCLI-RSSI-Resources-r16
                                        INTEGER ::= 64
                                                            -- Maximum number of CLI-RSSI resources for UE
                                                            -- Maximum number of CLI-RSSI resources for UE minus 1
maxNrofCLI-RSSI-Resources-1-r16
                                        INTEGER ::= 63
maxNrofCLI-SRS-Resources-r16
                                        INTEGER ::= 32
                                                            -- Maximum number of SRS resources for CLI measurement for UE
maxCLI-Report-r16
                                        INTEGER ::= 8
maxNrofCC-Group-r17
                                        INTEGER ::= 16
                                                            -- Maximum number of CC groups for DC location report
                                                            -- Maximum number of configured grant configurations per BWP
maxNrofConfiguredGrantConfig-r16
                                        INTEGER ::= 12
                                                            -- Maximum number of configured grant configurations per BWP minus 1
maxNrofConfiguredGrantConfig-1-r16
                                        INTEGER ::= 11
maxNrofCG-Type2DeactivationState
                                        INTEGER ::= 16
                                                            -- Maximum number of deactivation state for type 2 configured grants per BWP
maxNrofConfiguredGrantConfigMAC-1-r16
                                                            -- Maximum number of configured grant configurations per MAC entity minus 1
                                        INTEGER ::= 31
                                                            -- Maximum number of SPS configurations per BWP
maxNrofSPS-Config-r16
                                        INTEGER ::= 8
```

```
-- Maximum number of SPS configurations per BWP minus 1
maxNrofSPS-Config-1-r16
                                        INTEGER ::= 7
maxNrofSPS-DeactivationState
                                        INTEGER ::= 16
                                                            -- Maximum number of deactivation state for SPS per BWP
                                                            -- Maximum number of Preconfigured PRS processing windows per DL BWP
maxNrofPPW-Config-r17
                                        INTEGER ::= 4
                                                            -- Maximum number of Preconfigured PRS processing windows minus 1
maxNrofPPW-ID-1-r17
                                        INTEGER ::= 15
maxNrOfTxTEGReport-r17
                                        INTEGER ::= 256
                                                            -- Maximum number of UE Tx Timing Error Group Report
maxNrOfTxTEG-ID-1-r17
                                                            -- Maximum number of UE Tx Timing Error Group ID minus 1
                                        INTEGER ::= 7
maxNrofDormancyGroups
                                        INTEGER ::= 5
maxNrofPagingSubgroups-r17
                                        INTEGER ::= 8
                                                            -- Maximum number of paging subgroups per paging occasion
maxNrofPUCCH-ResourceGroups-1-r16
                                        INTEGER ::= 3
maxNrofRegComDC-Location-r17
                                                            -- Maximum number of requested carriers/BWPs combinations for DC location
                                        INTEGER ::= 128
                                                            -- Maximum number of serving cells in simultaneousTCI-UpdateList
maxNrofServingCellsTCI-r16
                                        INTEGER ::= 32
maxNrofTxDC-TwoCarrier-r16
                                                            -- Maximum number of UL Tx DC locations reported by the UE for 2CC uplink CA
                                        INTEGER ::= 64
maxNrofRB-SetGroups-r17
                                        INTEGER ::= 8
                                                            -- Maximum number of RB set groups
maxNrofRB-Sets-r17
                                        INTEGER ::= 8
                                                            -- Maximum number of RB sets
                                                            -- Maximum number of enhanced type 3 HARQ-ACK codebook
maxNrofEnhType3HARO-ACK-r17
                                        INTEGER ::= 8
                                                            -- Maximum number of enhanced type 3 HARO-ACK codebook minus 1
maxNrofEnhType3HARO-ACK-1-r17
                                        INTEGER ::= 7
                                                            -- Maximum number of PRS resources for one set
maxNrofPRS-ResourcesPerSet-r17
                                        INTEGER ::= 64
                                                            -- Maximum number of PRS resources for one set minus 1
maxNrofPRS-ResourcesPerSet-1-r17
                                        INTEGER ::= 63
maxNrofPRS-ResourceOffsetValue-1-r17
                                        INTEGER ::= 511
maxNrofGapId-r17
                                        INTEGER ::= 8
                                                            -- Maximum number of measurement gap ID is FFS
                                                            -- Maximum number of preconfigured positioning measurement gap
maxNrofPreConfigPosGapId-r17
                                        INTEGER ::= 16
maxNrOfGapPri-r17
                                                            -- Maximum number of gap priority level
                                        INTEGER ::= 16
                                        INTEGER ::= 4
                                                            -- Maximum number of CEF reports by the UE
maxCEFReport-r17
maxNrofMultiplePDSCHs-r17
                                        INTEGER ::= 8
                                                            -- Maximum number of PDSCHs in PDSCH TDRA list
maxSliceInfo-r17
                                        INTEGER ::= 8
                                                            -- Maximum number of NSAGs
maxCellSlice-r17
                                        INTEGER ::= 16
                                                            -- Maximum number of cells supporting the NSAG
                                                            -- Maximum number of TRS resource sets
maxNrofTRS-ResourceSets-r17
                                        INTEGER ::= 64
                                                            -- Maximum number of search space groups minus 1
maxNrofSearchSpaceGroups-1-r17
                                        INTEGER ::= 2
maxNrofRemoteUE-r17
                                                            -- Maximum number of connected L2 U2N Remote UEs
                                        INTEGER ::= 32
                                                            -- Maximum size of DCI format 4-2
maxDCI-4-2-Size-r17
                                        INTEGER ::= 140
maxFreqMBS-r17
                                        INTEGER ::= 16
                                                            -- Maximum number of MBS frequencies reported in MBSInterestIndication
maxNrofDRX-ConfigPTM-r17
                                        INTEGER ::= 64
                                                            -- Max number of DRX configuration for PTM provided in MBS broadcast in a
maxNrofDRX-ConfigPTM-1-r17
                                        INTEGER ::= 63
                                                            -- Max number of DRX configuration for PTM provided in MBS broadcast in a
                                                            -- cell minus 1
maxNrofMBS-ServiceListPerUE-r17
                                        INTEGER ::= 16
                                                            -- Maximum number of services which the UE can include in the MBS interest
                                                            -- indication
maxNrofMBS-Session-r17
                                                            -- Maximum number of MBS sessions provided in MBS broadcast in a cell
                                        INTEGER ::= 1024
maxNrofMTCH-SSB-MappingWindow-r17
                                        INTEGER ::= 16
                                                            -- Maximum number of MTCH to SSB beam mapping pattern
                                                            -- Maximum number of MTCH to SSB beam mapping pattern minus 1
maxNrofMTCH-SSB-MappingWindow-1-r17
                                        INTEGER ::= 15
                                        INTEGER ::= 4
                                                            -- Maximum number of broadcast MRBs configured for one MBS broadcast service
maxNrofMRB-Broadcast-r17
maxNrofPageGroup-r17
                                                            -- Maximum number of paging groups in a paging message
                                        INTEGER ::= 32
maxNrofPDSCH-ConfigPTM-r17
                                                            -- Maximum number of PDSCH configuration groups for PTM
                                        INTEGER ::= 16
maxNrofPDSCH-ConfigPTM-1-r17
                                        INTEGER ::= 15
                                                            -- Maximum number of PDSCH configuration groups for PTM minus 1
                                                            -- Maximum number of G-RNTI that can be configured for a UE.
maxG-RNTI-r17
                                        INTEGER ::= 16
maxG-RNTI-1-r17
                                        INTEGER ::= 15
                                                            -- Maximum number of G-RNTI that can be configured for a UE minus 1.
maxG-CS-RNTI-r17
                                        INTEGER ::= 8
                                                            -- Maximum number of G-CS-RNTI that can be configured for a UE.
maxG-CS-RNTI-1-r17
                                        INTEGER ::= 7
                                                            -- Maximum number of G-CS-RNTI that can be configured for a UE minus 1.
                                                            -- Maximum number of multicast MRBs (that can be added in MRB-ToAddModLIst)
maxMRB-r17
                                        INTEGER ::= 32
                                                            -- Maximum number of MBS frequency selection area identities
maxFSAI-MBS-r17
                                        INTEGER ::= 64
maxNeighCellMBS-r17
                                        INTEGER ::= 8
                                                            -- Maximum number of MBS broadcast neighbour cells
maxNrofPdcch-BlindDetectionMixed-1-r16 INTEGER ::= 7
                                                            -- Maximum number of combinations of mixed Rel-16 and Rel-15 PDCCH
                                                            -- monitoring capabilities minus 1
```

maxNrofPdcch-BlindDetection-r17

INTEGER ::= 16

-- Maximum number of combinations of PDCCH blind detection monitoring -- capabilities

- -- TAG-MULTIPLICITY-AND-TYPE-CONSTRAINT-DEFINITIONS-STOP
- -- ASN1STOP

Editor's note: maxK0-SchedulingOffset and maxK0-SchedulingOffset need confirmation by RAN1.

End of NR-RRC-Definitions

-- ASN1START

END

-- ASN1STOP

6.5 Short Message

Short Messages can be transmitted on PDCCH using P-RNTI with or without associated *Paging* message using Short Message field in DCI format 1_0 (see TS 38.212 [17], clause 7.3.1.2.1).

Table 6.5-1 defines Short Messages. Bit 1 is the most significant bit.

Table 6.5-1: Short Messages

Bit	Short Message
1	systemInfoModification
	If set to 1: indication of a BCCH modification other than SIB6, SIB7 and SIB8.
2	etwsAndCmasIndication
	If set to 1: indication of an ETWS primary notification and/or an ETWS secondary notification and/or a CMAS notification.
3	stopPagingMonitoring StopPagingMonitoring
	This bit can be used for only operation with shared spectrum channel access and if nrofPDCCH-MonitoringOccasionPerSSB-InPO is present.
	If set to 1: indication that the UE may stop monitoring PDCCH occasion(s) for paging in this Paging Occasion as specified in TS 38.304 [20], clause 7.1.
4	systemInfoModification-eDRX
	If set to 1: indication of a BCCH modification other than SIB6, SIB7 and SIB8. This indication applies only to UEs using eDRX cycle longer than the BCCH
	modification period.
5 – 8	Not used in this release of the specification, and shall be ignored by UE if received.

6.6 PC5 RRC messages

6.6.1 General message structure

PC5-RRC-Definitions

This ASN.1 segment is the start of the PC5 RRC PDU definitions.

```
-- ASN1START
-- TAG-PC5-RRC-DEFINITIONS-START
PC5-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
IMPORTS
    CellAccessRelatedInfo,
    SetupRelease,
    RRC-TransactionIdentifier,
    SN-FieldLengthAM,
    SN-FieldLengthUM,
    LogicalChannelIdentity,
    maxNrofSLRB-r16,
    maxNrofSL-RxInfoSet-r17,
    maxNrofSL-QFIs-r16,
    maxNrofSL-QFIsPerDest-r16,
    PagingCycle,
    PagingRecord,
    RSRP-Range,
    SL-MeasConfig-r16,
    SL-MeasId-r16,
    FreqBandList,
    FreqBandIndicatorNR,
    maxNrofRelayMeas-r17,
    maxSimultaneousBands,
    maxBandComb,
    maxBands,
    maxSIB-MessagePlus1-r17,
    maxSL-LCID-r16,
    BandParametersSidelink-r16,
    RLC-ParametersSidelink-r16,
    SIB1,
    SL-DRX-ConfigUC-r17,
    SL-DRX-ConfigUC-SemiStatic-r17,
    SL-PagingIdentityRemoteUE-r17,
    SL-RLC-ChannelID-r17,
    SL-SourceIdentity-r17,
    SystemInformation
FROM NR-RRC-Definitions;
```

```
-- TAG-PC5-RRC-DEFINITIONS-STOP
-- ASN1STOP
```

SBCCH-SL-BCH-Message

The SBCCH-SL-BCH-Message class is the set of RRC messages that may be sent from the UE to the UE via SL-BCH on the SBCCH logical channel.

SCCH-Message

The SCCH-Message class is the set of RRC messages that may be sent from the UE to the UE for unicast of NR sidelink communication on SCCH logical channel.

```
-- ASN1START
-- TAG-SCCH-MESSAGE-START
SCCH-Message ::=
                             SEQUENCE {
    message
                                     SCCH-MessageType
SCCH-MessageType ::=
                                     CHOICE {
    c1
        measurementReportSidelink
                                                  MeasurementReportSidelink,
        rrcReconfigurationSidelink
                                                  RRCReconfigurationSidelink,
        rrcReconfigurationCompleteSidelink
                                                  RRCReconfigurationCompleteSidelink,
        {\tt rrcReconfigurationFailureSidelink}
                                                  RRCReconfigurationFailureSidelink,
        ueCapabilityEnquirySidelink
                                                  UECapabilityEnquirySidelink,
        ueCapabilityInformationSidelink
                                                  UECapabilityInformationSidelink,
        uuMessageTransferSidelink-r17
                                                  UuMessageTransferSidelink-r17,
        remoteUEInformationSidelink-r17
                                                  RemoteUEInformationSidelink-r17
    messageClassExtension
                                    CHOICE {
                                        CHOICE {
```

6.6.2 Message definitions

MasterInformationBlockSidelink

The MasterInformationBlockSidelink includes the system information transmitted by a UE via SL-BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: SBCCH

Direction: UE to UE

MasterInformationBlockSidelink

```
-- ASN1START
-- TAG-MASTERINFORMATIONBLOCKSIDELINK-START
MasterInformationBlockSidelink ::=
                                             SEQUENCE {
    sl-TDD-Config-r16
                                                 BIT STRING (SIZE (12)),
    inCoverage-r16
                                                 BOOLEAN,
    directFrameNumber-r16
                                                 BIT STRING (SIZE (10)),
    slotIndex-r16
                                                 BIT STRING (SIZE (7)),
    reservedBits-r16
                                                 BIT STRING (SIZE (2))
-- TAG-MASTERINFORMATIONBLOCKSIDELINK-STOP
-- ASN1STOP
```

MasterInformationBlockSidelink field descriptions

directFrameNumber

Indicates the frame number in which S-SSB transmitted.

inCoverage

Value true indicates that the UE transmitting the MasterInformationBlockSidelink is in network coverage, or UE selects GNSS timing as the synchronization reference source.

slotIndex

Indicates the slot index in which S-SSB transmitted.

MeasurementReportSidelink

The MeasurementReportSidelink message is used for the indication of measurement results of NR sidelink.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

MeasurementReportSidelink message

```
-- ASN1START
-- TAG-MEASUREMENTREPORTSIDELINK-START
MeasurementReportSidelink ::=
                                                 SEOUENCE {
    criticalExtensions
        measurementReportSidelink-r16
                                                         MeasurementReportSidelink-r16-IEs,
        criticalExtensionsFuture
                                                         SEOUENCE {}
MeasurementReportSidelink-r16-IEs ::=
                                                 SEQUENCE {
    sl-measResults-r16
                                                     SL-MeasResults-r16,
    lateNonCriticalExtension
                                                     OCTET STRING
                                                                                                                               OPTIONAL,
    nonCriticalExtension
                                                     SEQUENCE { }
                                                                                                                               OPTIONAL
SL-MeasResults-r16 ::=
                                                 SEQUENCE {
    sl-MeasId-r16
                                                     SL-MeasId-r16,
    sl-MeasResult-r16
                                                     SL-MeasResult-r16,
SL-MeasResult-r16 ::=
                                                 SEQUENCE {
    sl-ResultDMRS-r16
                                                     SL-MeasQuantityResult-r16
                                                                                                                               OPTIONAL,
```

OPTIONAL,

```
SL-MeasQuantityResult-r16 ::= SEQUENCE {
    sl-RSRP-r16 RSRP-Range
    ...
}

SL-MeasResultListRelay-r17 ::= SEQUENCE (SIZE (1..maxNrofRelayMeas-r17)) OF SL-MeasResultRelay-r17

SL-MeasResultRelay-r17 ::= SEQUENCE (SIZE (1..maxNrofRelayMeas-r17)) OF SL-MeasResultRelay-r17

SL-MeasResultRelay-r17 SEQUENCE {
    cellIdentity-r17 SL-SourceIdentity-r17, SL-MeasResult-r16,
    ...
}

-- TAG-MEASUREMENTREPORTSIDELINK-STOP
```

MeasurementReportSidelink field descriptions

sI-MeasId

-- ASN1STOP

Identifies the sidelink measurement identity for which the reporting is being performed.

sl-MeasResult

Measured RSRP results of a unicast destination.

NotificationMessageSidelink

The NotificationMessageSidelink message is used to send notification message from U2N Relay UE to the connected U2N Remote UE.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: U2N Relay UE to U2N Remote UE

NotificationMessageSidelink message

```
-- ASN1START
-- TAG-NOTIFICATIONMESSAGESIDELINK-START

NotificationMessageSidelink-r17 ::= SEQUENCE {
    criticalExtensions CHOICE {
        notificationMessageSidelink-r17 CriticalExtensionsFuture SEQUENCE {}
    }
}

NotificationMessageSidelink-r17-IEs ::= SEQUENCE {
```

RemoteUEInformationSidelink

The RemoteUEInformationSidelink message is used to request SIB(s) or provide paging related information as specified in clause 5.8.9.8.1.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: L2 U2N Remote UE to L2 U2N Relay UE

RemoteUEInformationSidelink message

```
-- ASN1START
-- TAG-REMOTEUEINFORMATIONSIDELINK-START
RemoteUEInformationSidelink-r17 ::=
                                              SEQUENCE {
    criticalExtensions
        remoteUEInformationSidelink-r17
                                                      RemoteUEInformationSidelink-r17-IEs,
        criticalExtensionsFuture
                                                      SEQUENCE {}
RemoteUEInformationSidelink-r17-IEs ::=
                                              SEOUENCE {
                                                                                                    OPTIONAL, -- Need M
    sl-RequestedSIB-List-r17
                                                 SetupRelease { SL-RequestedSIB-List-r17}
                                                  SetupRelease { SL-PagingInfo-RemoteUE-r17}
                                                                                                     OPTIONAL, -- Need M
    sl-PagingInfo-RemoteUE-r17
   lateNonCriticalExtension
                                                  OCTET STRING
                                                                                                     OPTIONAL,
    nonCriticalExtension
                                                  SEQUENCE {}
                                                                                                     OPTIONAL
SL-RequestedSIB-List-r17 ::=
                                             SEQUENCE (SIZE (maxSIB-MessagePlus1-r17)) OF SL-SIB-ReqInfo-r17
SL-PagingInfo-RemoteUE-r17 ::=
                                              SEOUENCE {
    sl-PagingIdentityRemoteUE-r17
                                                  SL-PagingIdentityRemoteUE-r17,
    sl-PagingCycleRemoteUE-r17
                                                  PagingCycle
                                                                                                      OPTIONAL -- Need M
                                         ENUMERATED { sib1, sib2, sib3, sib4, sib5, sib6, sib7, sib8, sib9, sib10, sib11, sib12, sib13,
SL-SIB-RegInfo-r17 ::=
```

```
sib14, sib15, sib16, sib17, sib18, sib19, sib20, sib21, spare11, spare10, spare9, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1, ... }
```

-- TAG-REMOTEUEINFORMATIONSIDELINK-STOP -- ASN1STOP

RemoteUEInformationSidelink-IEs field descriptions

sl-RequestedSIB-List

Contains a list of requested SIBs.

sI-PagingInfo-RemoteUE

Indicates the paging information used by L2 U2N Relay UE to perform the connected L2 U2N Remote UE's paging monitoring.

sl-PagingIdentityRemoteUE

Indicates the L2 U2N Remote UE's paging UE ID.

sI-PagingCycleRemoteUE

Indicates the L2 U2N Remote UE's UE specific DRX cycle as the minimum value of the one provided by upper layers (if configured) and the one provided by RRC layer (if configured). Value rf32 corresponds to 32 radio frames, value rf64 corresponds to 64 radio frames and so on.

RRCReconfigurationSidelink

The RRCReconfigurationSidelink message is the command to AS configuration of the PC5 RRC connection. It is only applied to unicast of NR sidelink communication.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

RRCReconfigurationSidelink message

```
-- ASN1START
-- TAG-RRCRECONFIGURATIONSIDELINK-START
RRCReconfigurationSidelink ::=
                                        SEQUENCE {
    rrc-TransactionIdentifier-r16
                                            RRC-TransactionIdentifier,
    criticalExtensions
                                            CHOICE {
        rrcReconfigurationSidelink-r16
                                                RRCReconfigurationSidelink-r16-IEs,
        criticalExtensionsFuture
                                                SEOUENCE {}
RRCReconfigurationSidelink-r16-IEs ::= SEQUENCE {
    slrb-ConfigToAddModList-r16
                                            SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SLRB-Config-r16
                                                                                                                OPTIONAL, -- Need N
    slrb-ConfigToReleaseList-r16
                                            SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SLRB-PC5-ConfigIndex-r16
                                                                                                                OPTIONAL, -- Need N
    sl-MeasConfig-r16
                                            SetupRelease {SL-MeasConfig-r16}
                                                                                                                OPTIONAL, -- Need M
    sl-CSI-RS-Config-r16
                                            SetupRelease {SL-CSI-RS-Config-r16}
                                                                                                                OPTIONAL, -- Need M
```

```
sl-ResetConfig-r16
                                            ENUMERATED {true}
                                                                                                                 OPTIONAL, -- Need N
    sl-LatencyBoundCSI-Report-r16
                                            INTEGER (3..160)
                                                                                                                 OPTIONAL, -- Need M
    lateNonCriticalExtension
                                            OCTET STRING
                                                                                                                 OPTIONAL.
    nonCriticalExtension
                                            RRCReconfigurationSidelink-v1700-IEs
                                                                                                                 OPTIONAL
RRCReconfigurationSidelink-v1700-IEs ::= SEQUENCE {
    sl-DRX-ConfigUC-PC5-r17
                                            SetupRelease { SL-DRX-ConfigUC-r17 }
                                                                                                                 OPTIONAL, -- Need M
    sl-LatencyBoundIUC-Report-r17
                                            SetupRelease { SL-LatencyBoundIUC-Report-r17 }
                                                                                                                 OPTIONAL, -- Need M
    sl-RLC-ChannelToReleaseListPC5-r17
                                            SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-ChannelID-r17
                                                                                                                 OPTIONAL, -- Need N
    sl-RLC-ChannelToAddModListPC5-r17
                                            SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-ChannelConfiqPC5-r17 OPTIONAL, -- Need N
    nonCriticalExtension
                                            SEQUENCE {}
                                                                                                                 OPTIONAL
SL-LatencyBoundIUC-Report-r17::=
                                            INTEGER (3..160)
SLRB-Config-r16::=
                                        SEOUENCE {
    slrb-PC5-ConfigIndex-r16
                                            SLRB-PC5-ConfigIndex-r16,
                                            SL-SDAP-ConfigPC5-r16
    sl-SDAP-ConfiqPC5-r16
                                                                                                                 OPTIONAL, -- Need M
    sl-PDCP-ConfigPC5-r16
                                            SL-PDCP-ConfigPC5-r16
                                                                                                                 OPTIONAL, -- Need M
    sl-RLC-ConfigPC5-r16
                                            SL-RLC-ConfigPC5-r16
                                                                                                                 OPTIONAL, -- Need M
                                            SL-LogicalChannelConfigPC5-r16
                                                                                                                 OPTIONAL, -- Need M
    sl-MAC-LogicalChannelConfigPC5-r16
SLRB-PC5-ConfigIndex-r16 ::=
                                        INTEGER (1..maxNrofSLRB-r16)
SL-SDAP-ConfigPC5-r16 ::=
                                        SEOUENCE {
    sl-MappedOoS-FlowsToAddList-r16
                                            SEQUENCE (SIZE (1.. maxNrofSL-OFIsPerDest-r16)) OF SL-POFI-r16
                                                                                                                 OPTIONAL, -- Need N
                                            SEQUENCE (SIZE (1.. maxNrofSL-QFIsPerDest-r16)) OF SL-PQFI-r16
                                                                                                                 OPTIONAL, -- Need N
    sl-MappedOoS-FlowsToReleaseList-r16
    sl-SDAP-Header-r16
                                            ENUMERATED {present, absent},
SL-PDCP-ConfiqPC5-r16 ::=
                                        SEOUENCE {
    sl-PDCP-SN-Size-r16
                                            ENUMERATED {len12bits, len18bits}
                                                                                                                 OPTIONAL, -- Need M
    sl-OutOfOrderDelivery-r16
                                            ENUMERATED { true }
                                                                                                                 OPTIONAL, -- Need R
SL-RLC-ConfigPC5-r16 ::=
                                        CHOICE {
    sl-AM-RLC-r16
                                            SEOUENCE {
        sl-SN-FieldLengthAM-r16
                                                SN-FieldLengthAM
                                                                                                                 OPTIONAL, -- Need M
    sl-UM-Bi-Directional-RLC-r16
                                            SEOUENCE {
        sl-SN-FieldLengthUM-r16
                                                SN-FieldLengthUM
                                                                                                                 OPTIONAL, -- Need M
    sl-UM-Uni-Directional-RLC-r16
                                            SEOUENCE {
       sl-SN-FieldLengthUM-r16
                                                SN-FieldLengthUM
                                                                                                                 OPTIONAL, -- Need M
        . . .
```

```
SL-LogicalChannelConfigPC5-r16 ::=
                                        SEQUENCE {
    sl-LogicalChannelIdentity-r16
                                            LogicalChannelIdentity,
SL-POFI-r16 ::=
                                        INTEGER (1..64)
SL-CSI-RS-Config-r16 ::=
                                        SEQUENCE {
    sl-CSI-RS-FreqAllocation-r16
                                            CHOICE {
        sl-OneAntennaPort-r16
                                                BIT STRING (SIZE (12)),
        sl-TwoAntennaPort-r16
                                                BIT STRING (SIZE (6))
    sl-CSI-RS-FirstSymbol-r16
                                            INTEGER (3..12)
SL-RLC-ChannelConfigPC5-r17::=
                                        SEOUENCE {
    sl-RLC-ChannelID-PC5-r17
                                            SL-RLC-ChannelID-r17,
    sl-RLC-ConfigPC5-r17
                                            SL-RLC-ConfigPC5-r16
    sl-MAC-LogicalChannelConfigPC5-r17
                                            SL-LogicalChannelConfigPC5-r16
-- TAG-RRCRECONFIGURATIONSIDELINK-STOP
-- ASN1STOP
```

```
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M
```

RRCReconfigurationSidelink field descriptions

sI-CSI-RS-FreqAllocation

Indicates the frequency domain position for sidelink CSI-RS.

sI-CSI-RS-FirstSymbol

Indicates the position of first symbol of sidelink CSI-RS.

sI-DRX-ConfigUC-PC5

Indicates the NR sidelink DRX configuration for unicast communication, as specified in TS 38.321 [3]

sl-LatencyBoundCSI-Report

Indicates the latency bound of SL CSI report from the associated SL CSI triggering in terms of number of slots.

sl-LatencyBoundIUC-Report

Indicates the latency bound of SL Inter-UE coordination report from the associated SL Inter-UE coordination explicit request triggering in terms of number of slots.

sl-LogicalChannelIdentity

Indicates the identity of the sidelink logical channel.

sl-MappedQoS-FlowsToAddList

Indicate the QoS flows to be mapped to the configured sidelink DRB. Each entry is indicated by the SL-PQFI, which is used between UEs, as defined in TS 23.287 [55].

sl-MappedQoS-FlowsToReleaseList

Indicate the QoS flows to be released from the configured sidelink DRB. Each entry is indicated by the SL-PQFI, which is used between UEs, as defined in TS 23.287 [55].

sl-MeasConfig

Indicates the sidelink measurement configuration for the unicast destination.

sl-OutOfOrderDelivery

Indicates whether or not outOfOrderDelivery specified in TS 38.323 [5] is configured. This field should be either always present or always absent, after the sidelink radio bearer is established.

sI-PDCP-SN-Size

Indicates the PDCP SN size of the configured sidelink DRB.

sl-Resetconfia

Indicates that the full configuration should be applicable for the RRCReconfigurationSidelink message.

sI-SDAP-Header

Indicates whether or not a SDAP header is present on this sidelink DRB.

RRCReconfigurationCompleteSidelink

The RRCReconfigurationCompleteSidelink message is used to confirm the successful completion of a PC5 RRC AS reconfiguration. It is only applied to unicast of NR sidelink communication.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

RRCReconfigurationCompleteSidelink message

```
-- TAG-RRCRECONFIGURATIONCOMPLETESIDELINK-START
RRCReconfigurationCompleteSidelink ::=
                                               SEQUENCE {
   rrc-TransactionIdentifier-r16
                                                   RRC-TransactionIdentifier,
    criticalExtensions
        rrcReconfigurationCompleteSidelink-r16
                                                       RRCReconfigurationCompleteSidelink-r16-IEs,
        criticalExtensionsFuture
                                                       SEQUENCE {}
RRCReconfigurationCompleteSidelink-r16-IEs ::= SEQUENCE {
    lateNonCriticalExtension
                                                                                                                       OPTIONAL,
    nonCriticalExtension
                                                   RRCReconfigurationCompleteSidelink-v1710-IEs
                                                                                                                       OPTIONAL
RRCReconfigurationCompleteSidelink-v1710-IEs ::=
                                                   SEOUENCE {
                                                       ENUMERATED {true},
    nonCriticalExtension
                                                       RRCReconfigurationCompleteSidelink-v1720-IEs
                                                                                                                       OPTIONAL
RRCReconfigurationCompleteSidelink-v1720-IEs ::=
                                                   SEQUENCE {
    sl-DRX-ConfigReject-v1720
                                                       ENUMERATED {true}
                                                                                                                       OPTIONAL,
    nonCriticalExtension
                                                       SEOUENCE {}
                                                                                                                       OPTIONAL
-- TAG-RRCRECONFIGURATIONCOMPLETESIDELINK-STOP
```

RRCReconfigurationCompleteSidelink field descriptions

dummy

-- ASN1STOP

This field is not used in the specification. The UE shall not include this field. If received it shall be ignored by the peer UE.

sI-DRX-ConfigReject

Indicates the rejection of sidelink DRX configuration received from the peer UE for the corresponding NR sidelink unicast communication.

RRCReconfigurationFailureSidelink

The RRCReconfigurationFailureSidelink message is used to indicate the failure of a PC5 RRC AS reconfiguration. It is only applied to unicast of NR sidelink communication.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

RRCReconfigurationFailureSidelink message

```
-- ASN1START
-- TAG-RRCRECONFIGURATIONFAILURESIDELINK-START
RRCReconfigurationFailureSidelink ::=
   rrc-TransactionIdentifier-r16
                                                RRC-TransactionIdentifier,
   criticalExtensions
                                                 CHOICE {
       rrcReconfigurationFailureSidelink-r16
                                                    RRCReconfigurationFailureSidelink-r16-IEs,
       criticalExtensionsFuture
                                                    SEOUENCE {}
RRCReconfigurationFailureSidelink-r16-IEs ::= SEQUENCE {
   lateNonCriticalExtension
                                                OCTET STRING
                                                                                                                    OPTIONAL,
   nonCriticalExtension
                                                SEQUENCE {}
                                                                                                                    OPTIONAL
-- TAG-RRCRECONFIGURATIONFAILURESIDELINK-STOP
-- ASN1STOP
```

UEAssistanceInformationSidelink

The UEAssistanceInformationSidelink message may include sidelink DRX assistance information used to determine the sidelink DRX configuration.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

UEAssistanceInformationSidelink message

```
-- ASN1START
-- TAG-UEASSISTANCEINFORMATIONSIDELINK-START
UEAssistanceInformationSidelink-r17 ::=
                                              SEQUENCE {
    criticalExtensions
                                                  CHOICE {
       ueAssistanceInformationSidelink-r17
                                                      UEAssistanceInformationSidelink-r17-IEs,
        criticalExtensionsFuture
                                                      SEQUENCE {}
UEAssistanceInformationSidelink-r17-IEs ::= SEQUENCE {
    sl-PreferredDRX-ConfigList-r17
                                                  SEQUENCE (SIZE (1..maxNrofSL-RxInfoSet-r17)) OF SL-DRX-ConfigUC-SemiStatic-r17
                                                                                                        OPTIONAL, -- Need R
    lateNonCriticalExtension
                                                  OCTET STRING
                                                                                                        OPTIONAL,
```

```
nonCriticalExtension SEQUENCE {}

-- TAG-UEASSISTANCEINFORMATIONSIDELINK-STOP
-- ASN1STOP
```

UEAssistanceInformationSidelink field descriptions

sI-PreferredDRX-ConfigList

Indicates a list of the reference sidelink DRX configurations provided by a UE to a peer UE for determining the sidelink DRX configuration.

UECapabilityEnquirySidelink

The UECapabilityEnquirySidelink message is used to request UE sidelink capabilities. It is only applied to unicast of NR sidelink communication.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

UECapabilityEnquirySidelink message

```
-- ASN1START
-- TAG-UECAPABILITYENQUIRYSIDELINK-START
UECapabilityEnquirySidelink ::=
                                        SEQUENCE {
    rrc-TransactionIdentifier-r16
                                            RRC-TransactionIdentifier,
    criticalExtensions
                                            CHOICE {
       ueCapabilityEnquirySidelink-r16
                                                UECapabilityEnquirySidelink-r16-IEs,
        criticalExtensionsFuture
                                                SEOUENCE {}
UECapabilityEnquirySidelink-r16-IEs ::= SEQUENCE {
    frequencyBandListFilterSidelink-r16
                                            FreqBandList
                                                                                                                     OPTIONAL, -- Need N
    ue-CapabilityInformationSidelink-r16
                                           OCTET STRING
                                                                                                                     OPTIONAL, -- Need N
    lateNonCriticalExtension
                                            OCTET STRING
                                                                                                                     OPTIONAL,
    nonCriticalExtension
                                            SEQUENCE { }
                                                                                                                     OPTIONAL
-- TAG-UECAPABILITYENQUIRYSIDELINK-STOP
-- ASN1STOP
```

UECapabilityEnquirySidelink-IEs field descriptions

frequencyBandListFilterSidelink

This field is used to indicate frequency bands for which the peer UE is requested to provide supported bands and band combinations for NR sidelink communications. The UE always provides this field.

ue-CapabilityInformationSidelink

This field indicates the UECapabilityInformationSidelink message to provide the UE sidelink capability, which can be optionally sent together with UECapabilityEnquirySidelink.

UECapabilityInformationSidelink

The UECapabilityInformationSidelink message is used to transfer UE radio access capabilities. It is only applied to unicast of NR sidelink communication.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

UECapabilityInformationSidelink message

```
-- ASN1START
-- TAG-UECAPABILITYINFORMATIONSIDELINK-START
UECapabilityInformationSidelink ::=
                                            SEOUENCE {
   rrc-TransactionIdentifier-r16
                                                RRC-TransactionIdentifier.
    criticalExtensions
                                                CHOICE {
       ueCapabilityInformationSidelink-r16
                                                    UECapabilityInformationSidelink-r16-IEs,
                                                    SEQUENCE {}
        criticalExtensionsFuture
UECapabilityInformationSidelink-r16-IEs ::= SEQUENCE {
    accessStratumReleaseSidelink-r16
                                                AccessStratumReleaseSidelink-r16,
    pdcp-ParametersSidelink-r16
                                                PDCP-ParametersSidelink-r16
                                                                                                                        OPTIONAL,
    rlc-ParametersSidelink-r16
                                                RLC-ParametersSidelink-r16
                                                                                                                        OPTIONAL,
    supportedBandCombinationListSidelinkNR-r16 BandCombinationListSidelinkNR-r16
                                                                                                                        OPTIONAL,
    supportedBandListSidelink-r16
                                                SEQUENCE (SIZE (1..maxBands)) OF BandSidelinkPC5-r16
                                                                                                                        OPTIONAL.
    appliedFreqBandListFilter-r16
                                                FregBandList
                                                                                                                        OPTIONAL,
    lateNonCriticalExtension
                                                OCTET STRING
                                                                                                                        OPTIONAL,
    nonCriticalExtension
                                                UECapabilityInformationSidelink-v1700-IEs
                                                                                                                        OPTIONAL
UECapabilityInformationSidelink-v1700-IEs ::= SEQUENCE {
    mac-ParametersSidelink-r17
                                                  MAC-ParametersSidelink-r17
                                                                                                                        OPTIONAL,
    supportedBandCombinationListSidelinkNR-v1710 BandCombinationListSidelinkNR-v1710
                                                                                                                        OPTIONAL,
    nonCriticalExtension
                                                  SEOUENCE {}
                                                                                                                        OPTIONAL
```

```
MAC-ParametersSidelink-r17 ::= SEOUENCE {
    drx-OnSidelink-r17
                                                ENUMERATED {supported}
                                                                                                                          OPTIONAL,
AccessStratumReleaseSidelink-r16 ::= ENUMERATED { rel16, rel17, spare6, spare5, spare4, spare3, spare2, spare1, ... }
PDCP-ParametersSidelink-r16 ::= SEOUENCE {
    outOfOrderDeliverySidelink-r16
                                                ENUMERATED {supported}
                                                                             OPTIONAL,
BandCombinationListSidelinkNR-r16 ::= SEOUENCE (SIZE (1...maxBandComb)) OF BandCombinationParametersSidelinkNR-r16
BandCombinationListSidelinkNR-v1710 ::= SEOUENCE (SIZE (1..maxBandComb)) OF BandCombinationParametersSidelinkNR-v1710
BandCombinationParametersSidelinkNR-r16 ::= SEOUENCE (SIZE (1..maxSimultaneousBands)) OF BandParametersSidelink-r16
BandCombinationParametersSidelinkNR-v1710 ::= SEOUENCE (SIZE (1..maxSimultaneousBands)) OF BandParametersSidelink-v1710
BandParametersSidelink-v1710 ::=
                                    SEOUENCE {
    --32-5a-1
                                        ENUMERATED {supported}
    tx-IUC-Scheme1-Mode2Sidelink-r17
                                                                                     OPTIONAL,
    --32-5b-1
    tx-IUC-Scheme2-Mode2Sidelink-r17
                                        ENUMERATED {n4, n8, n16}
                                                                                     OPTIONAL
BandSidelinkPC5-r16 ::=
                                  SEQUENCE {
                                      FreqBandIndicatorNR,
    fregBandSidelink-r16
    --15-1
    sl-Reception-r16
                                      SEQUENCE {
                                          ENUMERATED {n16, n24, n32, n64},
       harg-RxProcessSidelink-r16
       pscch-RxSidelink-r16
                                          ENUMERATED {value1, value2},
       scs-CP-PatternRxSidelink-r16
                                          CHOICE {
           fr1-r16
                                              SEOUENCE {
                scs-15kHz-r16
                                                  BIT STRING (SIZE (16))
                                                                                                     OPTIONAL,
                scs-30kHz-r16
                                                  BIT STRING (SIZE (16))
                                                                                                     OPTIONAL,
                scs-60kHz-r16
                                                  BIT STRING (SIZE (16))
                                                                                                     OPTIONAL
            fr2-r16
                                              SEOUENCE {
                                                  BIT STRING (SIZE (16))
                scs-60kHz-r16
                                                                                                     OPTIONAL,
                scs-120kHz-r16
                                                  BIT STRING (SIZE (16))
                                                                                                     OPTIONAL
                                                                                                     OPTIONAL,
                                          ENUMERATED {supported}
        extendedCP-RxSidelink-r16
                                                                                                     OPTIONAL
                                                                                                     OPTIONAL,
    --15-10
    sl-Tx-256QAM-r16
                                      ENUMERATED {supported}
                                                                                                     OPTIONAL,
    --15-12
    lowSE-640AM-MCS-TableSidelink-r16 ENUMERATED {supported}
                                                                                                     OPTIONAL,
    [ [
    --15-14
    csi-ReportSidelink-r16
                                          SEOUENCE {
```

```
csi-RS-PortsSidelink-r16
                                               ENUMERATED {p1, p2}
                                                                                                      OPTIONAL,
    --15-19
    rankTwoReception-r16
                                           ENUMERATED {supported}
                                                                                                      OPTIONAL,
    sl-openLoopPC-RSRP-ReportSidelink-r16 ENUMERATED {supported}
                                                                                                      OPTIONAL,
    --13-1
                                           ENUMERATED {supported}
    sl-Rx-256QAM-r16
                                                                                                      OPTIONAL
    ] ]
    --32-5a-2
                                                   ENUMERATED {supported}
    rx-IUC-Schemel-PreferredMode2Sidelink-r17
                                                                                                     OPTIONAL,
    rx-IUC-Schemel-NonPreferredMode2Sidelink-r17 ENUMERATED {supported}
                                                                                                     OPTIONAL,
    rx-IUC-Scheme2-Mode2Sidelink-r17
                                                    ENUMERATED {n5, n15, n25, n32, n35, n45, n50, n64} OPTIONAL,
    --32-6-1
                                                    ENUMERATED {supported}
    rx-IUC-Schemel-SCI-r17
                                                                                                      OPTIONAL,
                                                    ENUMERATED {supported}
    rx-IUC-Schemel-SCI-ExplicitReg-r17
                                                                                                      OPTIONAL,
                                                    ENUMERATED {supported}
    scheme2-ConflictDeterminationRSRP-r17
                                                                                                      OPTIONAL
    11
-- TAG-UECAPABILITYINFORMATIONSIDELINK-STOP
-- ASN1STOP
```

UuMessageTransferSidelink

The UuMessageTransferSidelink message is used for the sidelink transfer of Paging message and System Information messages.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: L2 U2N Relay UE to L2 U2N Remote UE

UuMessageTransferSidelink message

```
-- ASN1START
-- TAG-UUMESSAGETRANSFERSIDELINK-START

UuMessageTransferSidelink-r17 ::= SEQUENCE {
    criticalExtensions CHOICE {
        uuMessageTransferSidelink-r17 UuMessageTransferSidelink-r17-IEs,
        criticalExtensionsFuture SEQUENCE {}
```

```
UuMessageTransferSidelink-r17-IEs ::=
                                      SEOUENCE {
    sl-PagingDelivery-r17
                                              OCTET STRING (CONTAINING PagingRecord)
                                                                                                     OPTIONAL, -- Need N
    sl-SIB1-Delivery-r17
                                              OCTET STRING (CONTAINING SIB1)
                                                                                                     OPTIONAL, -- Need N
                                                                                                     OPTIONAL, -- Need N
    sl-SystemInformationDelivery-r17
                                              OCTET STRING (CONTAINING SystemInformation)
   lateNonCriticalExtension
                                              OCTET STRING
                                                                                                     OPTIONAL,
    nonCriticalExtension
                                              SEQUENCE {}
                                                                                                     OPTIONAL
-- TAG-UUMESSAGETRANSFERSIDELINK-STOP
```

UuMessageTransferSidelink-IEs field descriptions

sl-PagingDelivery

-- ASN1STOP

This field is used to transfer PagingRecord relevant to the L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE.

sI-SIB1-Delivery

This field is used to transfer SIB1 to the L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE.

sl-SystemInformationDelivery

This field is used to transfer SIBs to the L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE.

End of PC5-RRC-Definitions

-- ASN1START

END

-- ASN1STOP

7 Variables and constants

- 7.1 Timers
- 7.1.1 Timers (Informative)

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Timer	Start	Stop	At expiry
T300	Upon transmission of RRCSetupRequest.	Upon reception of RRCSetup or RRCReject message, cell reselection, relay reselection, and upon abortion of connection establishment by upper layers.	Perform the actions as specified in 5.3.3.7.
T301	Upon transmission of RRCReestabilshmentRe quest	Upon reception of RRCReestablishment or RRCSetup message as well as when the selected cell becomes unsuitable or the (re)selected L2 U2N Relay UE becomes unsuitable, upon reception of notificationMessageSidelink indicating relayUE-HO or relayUE-CellReselection.	Go to RRC_IDLE
T302	Upon reception of RRCReject while performing RRC connection establishment or resume, upon reception of RRCRelease with waitTime.	Upon entering RRC_CONNECTED or RRC_IDLE, upon cell reselection, upon cell change due to relay (re)selection, and upon reception of RRCReject message.	Inform upper layers about barring alleviation as specified in 5.3.14.4
T304	Upon reception of RRCReconfiguration message including reconfigurationWithSync for the MCG which does not include sl-PathSwitchConfig, or upon reception of RRCReconfiguration message including reconfigurationWithSync for the SCG not indicated as deactivated in the NR or E-UTRA message containing the RRCReconfiguration message or upon conditional reconfiguration execution i.e. when applying a stored RRCReconfiguration message including reconfigurationWithSync.	Upon successful completion of random access on the corresponding SpCell For T304 of SCG, upon SCG release	For T304 of MCG, in case of the handover from NR or intra-NR handover, or path switch from a L2 U2N Relay UE to a NR cell, initiate the RRC reestablishment procedure; In case of handover to NR, perform the actions defined in the specifications applicable for the source RAT. If any DAPS bearer is configured and if there is no RLF in source PCell, initiate the failure information procedure. For T304 of SCG, inform network about the reconfiguration with sync failure by initiating the SCG failure information procedure as specified in 5.7.3.

Timer	Start	Stop	At expiry
T310	Upon detecting physical layer problems for the SpCell i.e. upon receiving N310 consecutive out-of-sync indications from lower layers.	Upon receiving N311 consecutive in-sync indications from lower layers for the SpCell, upon receiving RRCReconfiguration with reconfigurationWithSync for that cell group, upon reception of MobilityFromNRCommand, upon the reconfiguration of rlf- TimersAndConstant, upon initiating the connection re- establishment procedure, upon conditional reconfiguration execution i.e. when applying a stored RRCReconfiguration message including reconfigurationWithSync for that cell group, and upon initiating the MCG failure information procedure. Upon SCG release, if the T310 is kept in SCG.	If the T310 is kept in MCG: If AS security is not activated: go to RRC_IDLE else: initiate the MCG failure information procedure as specified in 5.7.3b or the connection reestablishment procedure as specified in 5.3.7 or the procedure as specified in 5.3.10.3 if any DAPS bearer is configured. If the T310 is kept in SCG, Inform E-UTRAN/NR about the SCG radio link failure by initiating the SCG failure information procedure as specified in 5.7.3.
T311	Upon initiating the RRC connection re-establishment procedure	Upon selection of a suitable NR cell, or upon selection of a suitable L2 U2N Relay UE, or a cell using another RAT.	Enter RRC_IDLE

Timer	Start	Stop	At expiry
T312	If T312 is configured in MCG: Upon triggering a measurement report for a measurement identity for which T312 has been configured and useT312 has been set to true, while T310 in PCell is running. If T312 is configured in SCG and useT312 has been set to true: Upon triggering a measurement report for a measurement identity for which T312 has been configured, while T310 in PSCell is running.	Upon receiving N311 consecutive in-sync indications from lower layers for the SpCell, receiving RRCReconfiguration with reconfigurationWithSync for that cell group, upon reception of MobilityFromNRCommand, upon initiating the connection re- establishment procedure, upon the reconfiguration of rlf- TimersAndConstant, upon initiating the MCG failure information procedure, upon conditional reconfiguration execution i.e. when applying a stored RRCReconfiguration message including reconfigurationWithSync for that cell group, and upon the expiry of T310 in corresponding SpCell. Upon SCG release, if the T312 is kept in SCG	If the T312 is kept in MCG initiate the MCG failure information procedure as specified in 5.7.3b or the connection re-establishment procedure. If the T312 is kept in SCG, Inform E-UTRAN/NR about the SCG radio link failure by initiating the SCG failure information procedure.as specified in 5.7.3.
T316	Upon transmission of the MCGFailureInformation message	Upon receiving RRCRelease, RRCReconfiguration with reconfigurationwithSync for the PCell, MobilityFromNRCommand, or upon initiating the reestablishment procedure	Perform the actions as specified in 5.7.3b.5.
T319	Upon transmission of RRCResumeRequest or RRCResumeRequest1 when the resume procedure is not initiated for SDT.	Upon reception of RRCResume, RRCSetup, RRCRelease, RRCRelease with suspendConfig or RRCReject message, upon cell re-selection or upon relay (re)selection.	Perform the actions as specified in 5.3.13.5.
T319a	Upon transmission of RRCResumeRequest or RRCResumeRequest1 when the resume procedure is initiated for SDT.	Upon reception of RRCResume, RRCSetup, RRCRelease, RRCReject message or upon failure to resume RRC connection for SDT as specified in 5.3.13.5 or upon cell reselection.	Perform the actions as specified in 5.3.13.5.

Timer	Start	Stop	At expiry
T320	Upon reception of t320 or upon cell (re)selection to NR from another RAT with validity time configured for dedicated priorities (in which case the remaining validity time is applied).	Upon entering RRC_CONNECTED, upon reception of <i>RRCRelease</i> , when PLMN selection or SNPN selection is performed on request by NAS, when the UE enters RRC_IDLE from RRC_INACTIVE, or upon cell (re)selection to another RAT (in which case the timer is carried on to the other RAT).	Discard the cell reselection priority information provided by dedicated signalling.
T321	Upon receiving measConfig including a reportConfig with the reportType set to reportCGI	Upon acquiring the information needed to set all fields of cgi- info, upon receiving measConfig that includes removal of the reportConfig with the reportType set to reportCGI and upon detecting that a cell is not broadcasting SIB1.	Initiate the measurement reporting procedure, stop performing the related measurements.
T322	Upon receiving measConfig including reportConfigNR with the reportType set to reportSFTD and drx-SFTD-NeighMeas is set to true.	Upon acquiring the SFTD measurement results, upon receiving measConfig that includes removal of the reportConfig with the reportType set to reportSFTD.	Initiate the measurement reporting procedure, stop performing the related measurements.
T325	Upon reception of RRCRelease message with deprioritisationTimer.		Stop deprioritisation of all frequencies or NR signalled by RRCRelease.
T330	Upon receiving LoggedMeasurementCon figuration message	Upon log volume exceeding the suitable UE memory, upon initiating the release of LoggedMeasurementConfiguration procedure	Perform the actions specified in 5.5a.1.4
T331	Upon receiving RRCRelease message with measIdleDuration	Upon receiving RRCSetup, RRCResume, RRCRelease with idle/inactive measurement configuration, upon cell selection/reselection to a cell that does not belong to the validityArea (if configured), or upon cell re-selection to another RAT.	Perform the actions as specified in 5.7.8.3.

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Timer	Start	Stop	At expiry
T342	Upon transmitting UEAssistanceInformation message with DelayBudgetReport.	Upon releasing delayBudgetReportingConfig during the connection reestablishment/resume procedures, and upon receiving delayBudgetReportingConfig set to release.	No action.
T345	Upon transmitting UEAssistanceInformation message with overheatingAssistance	Upon releasing overheatingAssistanceConfig during the connection reestablishment procedure, upon initiating the connection resumption procedure, and upon receiving overheatingAssistanceConfig set to release.	No action.
T346a (The UE maintains one instance of this timer per cell group)	Upon transmitting UEAssistanceInformation message with drx- Preference.	Upon releasing drx- PreferenceConfig during the connection re- establishment/resume procedures, upon receiving drx- PreferenceConfig set to release, or upon performing MR-DC release.	No action.
T346b (The UE maintains one instance of this timer per cell group)	Upon transmitting UEAssistanceInformation message with maxBW- Preference.	Upon releasing maxBW- PreferenceConfig during the connection re- establishment/resume procedures, upon receiving maxBW-PreferenceConfig set to release, or upon performing MR- DC release.	No action.
T346c (The UE maintains one instance of this timer per cell group)	Upon transmitting UEAssistanceInformation message with maxCC- Preference.	Upon releasing maxCC- PreferenceConfig during the connection re- establishment/resume procedures, upon receiving maxCC-PreferenceConfig set to release, or upon performing MR- DC release.	No action.

Timer	Start	Stop	At expiry
T346d (The UE maintains one instance of this timer per cell group)	Upon transmitting UEAssistanceInformation message with maxMIMO- LayerPreference.	Upon releasing maxMIMO- LayerPreferenceConfig during the connection re- establishment/resume procedures, upon receiving maxMIMO- LayerPreferenceConfig set to release, or upon performing MR- DC release.	No action.
T346e (The UE maintains one instance of this timer per cell group)	Upon transmitting UEAssistanceInformation message with minSchedulingOffsetPref erence.	Upon releasing minSchedulingOffsetPreference Config during the connection reestablishment/resume procedures, upon receiving minSchedulingOffsetPreference Config set to release, or upon performing MR-DC release.	No action.
T346f	Upon transmitting UEAssistanceInformation message with releasePreference.	Upon releasing releasePreferenceConfig during the connection reestablishment/resume procedures, or upon receiving releasePreferenceConfig set to release.	No action.
T346g	Upon transmitting UEAssistanceInformation message with musim- PreferredRRC-State.	Upon receiving RRCRelease, or upon receiving musim- LeaveAssistanceConfig set to release.	Perform the actions as specified in 5.3.8.6.
T346h	Upon transmitting UEAssistanceInformation message with musim- GapPreferenceList Information.	Upon releasing musim- GapAssistanceConfig during the connection re- establishment/resume procedures, or upon receiving musim-GapAssistanceConfig set to release.	No action.
T346i	Upon transmitting UEAssistanceInformation message with scg- DeactivationPreference	Upon releasing scg- DeactivationPreferenceConfig during RRC connection re- establishment/resume or upon receiving scg- DeactivationPreferenceConfig set to release.	No action.

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Timer	Start	Stop	At expiry
T346j (The UE maintains one instance of this timer per cell group)	Upon transmitting UEAssistanceInformation message with rlm- RelaxationReportingConfi g.	Upon releasing rlm- RelaxationReportingConfig during the connection re- establishment/resume procedures, upon receiving rlm- RelaxationReportingConfig set to release, or upon performing MR-DC release.	No action.
T346k (The UE maintains one instance of this timer per cell group)	Upon transmitting UEAssistanceInformation message with bfd- RelaxationReportingConfi g.	Upon releasing bfd- RelaxationReportingConfig during the connection re- establishment/resume procedures, upon receiving bfd- RelaxationReportingConfig set to release, or upon performing MR-DC release.	No action.
T350	Upon transmitting DedicatedSIBRequest message with requestedSIB-List and/or requestedPosSIB-List.	Upon acquiring the requested SIB(s) or posSIB(s), upon releasing onDemandSIB-Request during the connection re-establishment procedures, upon receiving onDemandSIB-Request set to release, upon reception of RRCRelease or upon successful change of PCell while in RRC_CONNECTED.	No action
T380	Upon reception of t380 in RRCRelease.	Upon reception of RRCResume, RRCSetup or RRCRelease.	Perform the actions as specified in 5.3.13.
T390	When access attempt is barred at access barring check for an Access Category. The UE maintains one instance of this timer per Access Category.	Upon cell (re)selection, upon relay (re)selection, upon entering RRC_CONNECTED, upon reception of <i>RRCReconfiguration</i> including reconfigurationWithSync, upon change of PCell while in RRC_CONNECTED, upon reception of <i>MobilityFromNRCommand</i> , or upon reception of <i>RRCRelease</i> .	Perform the actions as specified in 5.3.14.4.
T400	Upon transmission of RRCReconfigurationSidel ink	Upon reception of RRCReconfigurationFailureSidel ink or RRCReconfigurationCompleteSidelink	Perform the Sidelink radio link failure related actions as specified in 5.8.9.3.

Timer	Start	Stop	At expiry
T420	Upon reception of the RRCReconfiguration message including sl- PathSwitchConfig	Upon successfully sending RRCReconfigurationComplete message (i.e., PC5 RLC acknowledgement is received from target L2 U2N Relay UE)	Perform the RRC re- establishment procedure as specified in 5.3.7.
T430	Start or restart from the subframe indicated by epochTime upon reception of SIB19, or upon reception of RRCReconfiguration message for the target cell including reconfiguration withSync, or upon conditional reconfiguration execution i.e. when applying a stored RRCReconfiguration message for the target cell including reconfigurationWithSync.	Stop T430, if it is running, for the source cell upon reception of RRCReconfiguration message including reconfigurationWithSync, or upon conditional reconfiguration execution i.e. when applying a stored RRCReconfiguration message including reconfigurationWithSync.	Perform the actions as specified in 5.2.2.6.

7.1.2 Timer handling

When the UE applies zero value for a timer, the timer shall be started and immediately expire unless explicitly stated otherwise.

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7.2 Counters

Counter	Reset	Incremented	When reaching max value
N310	Upon reception of "insync" indication from lower layers; upon receiving RRCReconfiguration with reconfigurationWithSync for that cell group; upon initiating the connection reestablishment procedure.	Upon reception of "out-of-sync" from lower layer while the timer T310 is stopped.	Start timer T310
N311	Upon reception of "out- of-sync" indication from lower layers; upon receiving RRCReconfiguration with reconfigurationWithSync for that cell group; upon initiating the connection re- establishment procedure.	Upon reception of the "in-sync" from lower layer while the timer T310 is running.	Stop the timer T310.

7.3 Constants

Constant	Usage
N310	Maximum number of consecutive "out-of-sync" indications for the SpCell received from lower layers
N311	Maximum number of consecutive "in-sync" indications for the SpCell received from lower layers

7.4 UE variables

NOTE: To facilitate the specification of the UE behavioural requirements, UE variables are represented using ASN.1. Unless explicitly specified otherwise, it is however up to UE implementation how to store the variables. The optionality of the IEs in ASN.1 is used only to indicate that the values may not always be available.

NR-UE-Variables

This ASN.1 segment is the start of the NR UE variable definitions.

```
-- ASN1START
-- NR-UE-VARIABLES-START
NR-UE-Variables DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
IMPORTS
    AreaConfiguration-v1700,
    ARFCN-ValueNR,
    CellIdentity,
    EUTRA-PhysCellId,
    maxCEFReport-r17,
    MeasId,
   MeasIdToAddModList,
    MeasIdleCarrierEUTRA-r16,
   MeasIdleCarrierNR-r16,
    MeasResultIdleEUTRA-r16,
    MeasResultIdleNR-r16,
    MeasObjectToAddModList,
    PhysCellId,
    RNTI-Value,
    ReportConfigToAddModList,
    RSRP-Range,
    SL-MeasId-r16,
    SL-MeasIdList-r16,
    SL-MeasObjectList-r16,
    SL-ReportConfigList-r16,
    SL-OuantityConfig-r16,
    Tx-PoolMeasList-r16,
    QuantityConfig,
    maxNrofCellMeas,
    maxNrofMeasId,
    maxFreqIdle-r16,
    PhysCellIdUTRA-FDD-r16,
    ValidityAreaList-r16,
    CondReconfigToAddModList-r16,
    ConnEstFailReport-r16,
    LoggingDuration-r16,
    LoggingInterval-r16,
    LogMeasInfoList-r16,
    LogMeasInfo-r16,
    RA-Report-r16,
    RLF-Report-r16,
    TraceReference-r16,
    WLAN-Identifiers-r16,
    WLAN-NameList-r16,
    BT-NameList-r16,
    PLMN-Identity,
    maxNrofRelayMeas-r17,
    maxPLMN,
    RA-ReportList-r16,
    VisitedCellInfoList-r16,
    AbsoluteTimeInfo-r16,
```

```
LoggedEventTriggerConfig-r16,
    LoggedPeriodicalReportConfig-r16,
    Sensor-NameList-r16.
    SL-SourceIdentity-r17,
    SuccessHO-Report-r17,
    PLMN-IdentityList2-r16,
    AreaConfiguration-r16,
    maxNrofSL-MeasId-r16,
    maxNrofFreqSL-r16,
    maxNrofCLI-RSSI-Resources-r16,
    maxNrofCLI-SRS-Resources-r16,
    RSSI-ResourceId-r16,
    SRS-ResourceId,
    VisitedPSCellInfoList-r17
FROM NR-RRC-Definitions;
-- NR-UE-VARIABLES-STOP
-- ASN1STOP
```

VarConditionalReconfig

The UE variable *VarConditionalReconfig* includes the accumulated configuration of the conditional handover, conditional PSCell addition or conditional PSCell addition or conditional PSCell change execution condition (associated *measId*(s)) and the stored target candidate SpCell *RRCReconfiguration*.

VarConditionalReconfig UE variable

```
-- ASN1START
-- TAG-VARCONDITIONALRECONFIG-START

VarConditionalReconfig ::= SEQUENCE {
    condReconfigList CondReconfigToAddModList-r16 OPTIONAL
}

-- TAG-VARCONDITIONALRECONFIG-STOP
-- ASN1STOP
```

VarConnEstFailReport

The UE variable VarConnEstFailReport includes the connection establishment failure and/or connection resume failure information.

VarConnEstFailReport UE variable

```
-- ASN1START
-- TAG-VARCONNESTFAILREPORT-START

VarConnEstFailReport-r16 ::= SEQUENCE {
```

VarConnEstFailReportList

The UE variable VarConnEstFailReportList includes a list of the connection establishment failure and/or connection resume failure information.

VarConnEstFailReportList UE variable

VarLogMeasConfig

The UE variable *VarLogMeasConfig* includes the configuration of the logging of measurements to be performed by the UE while in RRC_IDLE, RRC_INACTIVE, covering intra-frequency, inter-frequency and inter-RAT mobility related measurements. The UE performs logging of measurements only while in RRC_IDLE and RRC_INACTIVE.

VarLogMeasConfig UE variable

```
-- ASN1START
-- TAG-VARLOGMEASCONFIG-START
VarLogMeasConfig-r16-IEs ::= SEQUENCE {
    areaConfiguration-r16
                                 AreaConfiguration-r16
                                                               OPTIONAL,
   bt-NameList-r16
                                 BT-NameList-r16
                                                               OPTIONAL,
    wlan-NameList-r16
                                 WLAN-NameList-r16
                                                               OPTIONAL,
    sensor-NameList-r16
                                 Sensor-NameList-r16
                                                               OPTIONAL,
    loggingDuration-r16
                                 LoggingDuration-r16,
                                 CHOICE {
    reportType
       periodical
                                     LoggedPeriodicalReportConfig-r16,
        eventTriggered
                                     LoggedEventTriggerConfig-r16
    earlyMeasIndication-r17
                                 ENUMERATED {true}
                                                               OPTIONAL,
    areaConfiguration-v1700
                                 AreaConfiguration-v1700
                                                               OPTIONAL
  TAG-VARLOGMEASCONFIG-STOP
```

-- ASN1STOP

VarLogMeasReport

The UE variable VarLogMeasReport includes the logged measurements information.

VarLogMeasReport UE variable

```
-- ASN1START
-- TAG-VARLOGMEASREPORT-START
VarLogMeasReport-r16 ::=
                            SEQUENCE {
    absoluteTimeInfo-r16
                                AbsoluteTimeInfo-r16,
    traceReference-r16
                                TraceReference-r16,
    traceRecordingSessionRef-r16 OCTET STRING (SIZE (2)),
    tce-Id-r16
                               OCTET STRING (SIZE (1)),
    logMeasInfoList-r16
                                LogMeasInfoList-r16,
    plmn-IdentityList-r16
                                PLMN-IdentityList2-r16,
    sigLoggedMeasType-r17
                                ENUMERATED {true}
-- TAG-VARLOGMEASREPORT-STOP
-- ASN1STOP
```

VarMeasConfig

The UE variable *VarMeasConfig* includes the accumulated configuration of the measurements to be performed by the UE, covering intra-frequency, inter-frequency and inter-RAT mobility related measurements.

VarMeasConfig UE variable

```
-- ASN1START
-- TAG-VARMEASCONFIG-START
VarMeasConfig ::=
                                    SEQUENCE {
    -- Measurement identities
    measIdList
                                        MeasIdToAddModList
                                                                             OPTIONAL,
    -- Measurement objects
                                        MeasObjectToAddModList
    measObjectList
                                                                             OPTIONAL,
    -- Reporting configurations
    reportConfigList
                                        ReportConfigToAddModList
                                                                             OPTIONAL,
    -- Other parameters
    quantityConfig
                                        QuantityConfig
                                                                             OPTIONAL,
    s-MeasureConfig
                                            CHOICE {
        ssb-RSRP
                                                 RSRP-Range,
        csi-RSRP
                                                 RSRP-Range
                                                                             OPTIONAL
```

```
}
-- TAG-VARMEASCONFIG-STOP
-- ASN1STOP
```

VarMeasConfigSL

The UE variable VarMeasConfigSL includes the accumulated configuration of the NR sidelink measurements to be performed by the UE of unicast destination.

VarMeasConfigSL UE variable

```
-- ASN1START
-- TAG-VARMEASCONFIGSL-START
                                               SEOUENCE {
VarMeasConfiqSL-r16 ::=
    -- NR sidelink measurement identities
    sl-MeasIdList-r16
                                                   SL-MeasIdList-r16
                                                                                               OPTIONAL,
    -- NR sidelink measurement objects
    sl-MeasObjectList-r16
                                                   SL-MeasObjectList-r16
                                                                                               OPTIONAL,
    -- NR sidelink reporting configurations
    sl-reportConfiqList-r16
                                                   SL-ReportConfigList-r16
                                                                                               OPTIONAL,
    -- Other parameters
    sl-QuantityConfig-r16
                                                   SL-QuantityConfig-r16
                                                                                               OPTIONAL
-- TAG-VARMEASCONFIGSL-STOP
-- ASN1STOP
```

VarMeasIdleConfig

The UE variable *VarMeasIdleConfig* includes the configuration of the measurements to be performed by the UE while in RRC_IDLE or RRC_INACTIVE for NR interfrequency and inter-RAT (i.e. EUTRA) measurements.

VarMeasIdleConfig UE variable

```
-- ASN1START
-- TAG-VARMEASIDLECONFIG-START
VarMeasIdleConfig-r16 ::=
                             SEQUENCE {
    measIdleCarrierListNR-r16
                                 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierNR-r16
                                                                                                                 OPTIONAL,
    measIdleCarrierListEUTRA-r16 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierEUTRA-r16
                                                                                                                 OPTIONAL,
   measIdleDuration-r16
                                 ENUMERATED {sec10, sec30, sec60, sec120, sec180, sec240, sec300, spare},
    validityAreaList-r16
                                 ValidityAreaList-r16
                                                                                                                 OPTIONAL
-- TAG-VARMEASIDLECONFIG-STOP
-- ASN1STOP
```

VarMeasIdleReport

The UE variable VarMeasIdleReport includes the logged measurements information.

VarMeasIdleReport UE variable

The UE variable VarMeasReportList includes information about the measurements for which the triggering conditions have been met.

VarMeasReportList UE variable

```
-- ASN1START
-- TAG-VARMEASREPORTLIST-START
VarMeasReportList ::=
                                    SEQUENCE (SIZE (1..maxNrofMeasId)) OF VarMeasReport
                                    SEQUENCE {
VarMeasReport ::=
    -- List of measurement that have been triggered
                                        MeasId,
    cellsTriggeredList
                                        CellsTriggeredList
                                                                        OPTIONAL,
    numberOfReportsSent
                                        INTEGER,
    cli-TriggeredList-r16
                                        CLI-TriggeredList-r16
                                                                        OPTIONAL,
    tx-PoolMeasToAddModListNR-r16
                                        Tx-PoolMeasList-r16
                                                                        OPTIONAL,
    relaysTriggeredList-r17
                                        RelaysTriggeredList-r17
                                                                        OPTIONAL
CellsTriggeredList ::=
                                    SEQUENCE (SIZE (1..maxNrofCellMeas)) OF CHOICE {
                                        PhysCellId,
    physCellId
                                        EUTRA-PhysCellId,
    physCellIdEUTRA
    physCellIdUTRA-FDD-r16
                                        PhysCellIdUTRA-FDD-r16
CLI-TriggeredList-r16 ::=
                                    CHOICE {
    srs-RSRP-TriggeredList-r16
                                        SRS-RSRP-TriggeredList-r16,
    cli-RSSI-TriggeredList-r16
                                        CLI-RSSI-TriggeredList-r16
```

```
SRS-RSRP-TriggeredList-r16 ::= SEQUENCE (SIZE (1.. maxNrofCLI-SRS-Resources-r16)) OF SRS-ResourceId

CLI-RSSI-TriggeredList-r16 ::= SEQUENCE (SIZE (1.. maxNrofCLI-RSSI-Resources-r16)) OF RSSI-ResourceId-r16

RelaysTriggeredList-r17 ::= SEQUENCE (SIZE (1.. maxNrofRelayMeas-r17)) OF SL-SourceIdentity-r17

-- TAG-VARMEASREPORTLIST-STOP
-- ASN1STOP
```

VarMeasReportListSL

The UE variable VarMeasReportListSL includes information about the NR sidelink measurements for which the triggering conditions have been met.

VarMeasReportListSL UE variable

```
-- ASN1START
-- TAG-VARMEASREPORTLISTSL-START
VarMeasReportListSL-r16 ::=
                                        SEQUENCE (SIZE (1..maxNrofSL-MeasId-r16)) OF VarMeasReportSL-r16
VarMeasReportSL-r16 ::=
                                        SEQUENCE {
   -- List of NR sidelink measurement that have been triggered
   sl-MeasId-r16
                                       SL-MeasId-r16,
                                     SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF ARFCN-ValueNR
   sl-FrequencyTriggeredList-r16
                                                                                                               OPTIONAL,
    sl-NumberOfReportsSent-r16
                                            INTEGER
-- TAG-VARMEASREPORTLISTSL-STOP
-- ASN1STOP
```

VarMobilityHistoryReport

The UE variable *VarMobilityHistoryReport* includes the mobility history information.

${\it Var Mobility History Report \, UE \, variable}$

```
-- TAG-VARMOBILITYHISTORYREPORT-STOP
-- ASN1STOP
```

VarPendingRNA-Update

The UE variable *VarPendingRNA-Update* indicates whether there is a pending RNA update procedure or not. The setting of this BOOLEAN variable to *true* means that there is a pending RNA Update procedure.

VarPendingRNA-Update UE variable

```
-- ASN1START
-- TAG-VARPENDINGRNA-UPDATE-START

VarPendingRNA-Update ::= SEQUENCE {
    pendingRNA-Update BOOLEAN OPTIONAL
}

-- TAG-VARPENDINGRNA-UPDATE-STOP
-- ASN1STOP
```

- VarRA-Report

The UE variable VarRA-Report includes the random-access related information.

VarRA-Report UE variable

```
-- ASN1START
-- TAG-VARRA-REPORT-START

VarRA-Report-r16 ::= SEQUENCE {
    ra-ReportList-r16 RA-ReportList-r16,
    plmn-IdentityList-r16 PLMN-IdentityList-r16
}

PLMN-IdentityList-r16 ::= SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity
-- TAG-VARRA-REPORT-STOP
-- ASN1STOP
```

VarResumeMAC-Input

The UE variable VarResumeMAC-Input specifies the input used to generate the resumeMAC-I during RRC Connection Resume procedure.

VarResumeMAC-Input variable

VarResumeMAC-Input field descriptions

targetCellIdentity

An input variable used to calculate the resumeMAC-I. Set to the cellIdentity of the first PLMN-Identity included in the PLMN-IdentityInfoList broadcasted in SIB1 of the target cell i.e. the cell the UE is trying to resume.

source-c-RNTI

Set to C-RNTI that the UE had in the PCell it was connected to prior to suspension of the RRC connection.

sourcePhysCellId

Set to the physical cell identity of the PCell the UE was connected to prior to suspension of the RRC connection.

VarRLF-Report

The UE variable VarRLF-Report includes the radio link failure information or handover failure information.

VarRLF-Report UE variable

VarShortMAC-Input

The UE variable VarShortMAC-Input specifies the input used to generate the shortMAC-I during RRC Connection Reestablishment procedure.

VarShortMAC-Input variable

```
-- ASN1START
-- TAG-VARSHORTMAC-INPUT-START

VarShortMAC-Input ::= SEQUENCE {
    sourcePhysCellId PhysCellId,
    targetCellIdentity CellIdentity,
    source-c-RNTI RNTI-Value
}

-- TAG-VARSHORTMAC-INPUT-STOP
-- ASN1STOP
```

VarShortMAC-Input field descriptions

targetCellIdentity

An input variable used to calculate the *shortMAC-I*. Set to the *cellIdentity* of the first *PLMN-Identity* in the *PLMN-IdentityInfoList* broadcasted in *SIB1* of the target cell i.e. the cell the UE is trying to reestablish the connection.

source-c-RNTI

Set to C-RNTI that the UE had in the PCell it was connected to prior to the reestablishment.

sourcePhysCellId

Set to the physical cell identity of the PCell the UE was connected to prior to the reestablishment.

VarSuccessHO-Report

The UE variable VarSuccessHO-Report includes the successful handover information.

VarSccessHO-Report variable

End of NR-UE-Variables

```
-- ASN1START
```

END

-- ASN1STOP

8 Protocol data unit abstract syntax

8.1 General

The RRC PDU contents in clause 6 and clause 10 are described using abstract syntax notation one (ASN.1) as specified in ITU-T Rec. X.680 [6] and X.681 [7]. Transfer syntax for RRC PDUs is derived from their ASN.1 definitions by use of Packed Encoding Rules, unaligned as specified in ITU-T Rec. X.691 [8].

The following encoding rules apply in addition to what has been specified in X.691:

- When a bit string value is placed in a bit-field as specified in 15.6 to 15.11 in X.691, the leading bit of the bit string value shall be placed in the leading bit of the bit-field, and the trailing bit of the bit string value shall be placed in the trailing bit of the bit-field;

NOTE: The terms 'leading bit' and 'trailing bit' are defined in ITU-T Rec. X.680. When using the 'bstring' notation, the leading bit of the bit string value is on the left, and the trailing bit of the bit string value is on the right.

- When decoding types constrained with the ASN.1 Contents Constraint ("CONTAINING"), automatic decoding of the contained type should not be performed because errors in the decoding of the contained type should not cause the decoding of the entire RRC message PDU to fail. It is recommended that the decoder first decodes the outer PDU type that contains the OCTET STRING or BIT STRING with the Contents Constraint, and then decodes the contained type that is nested within the OCTET STRING or BIT STRING as a separate step;
- When decoding a) RRC message PDUs, b) BIT STRING constrained with a Contents Constraint, or c) OCTET STRING constrained with a Contents Constraint, PER decoders are required to never report an error if there are extraneous zero or non-zero bits at the end of the encoded RRC message PDU, BIT STRING or OCTET STRING.

8.2 Structure of encoded RRC messages

An RRC PDU, which is the bit string that is exchanged between peer entities/across the radio interface contains the basic production as defined in X.691.

RRC PDUs shall be mapped to and from PDCP SDUs (in case of DCCH) or RLC SDUs (in case of PCCH, BCCH or CCCH) upon transmission and reception as follows:

- when delivering an RRC PDU as an PDCP SDU to the PDCP layer for transmission, the first bit of the RRC PDU shall be represented as the first bit in the PDCP SDU and onwards; and
- when delivering an RRC PDU as an RLC SDU to the RLC layer for transmission, the first bit of the RRC PDU shall be represented as the first bit in the RLC SDU and onwards; and
- upon reception of an PDCP SDU from the PDCP layer, the first bit of the PDCP SDU shall represent the first bit of the RRC PDU and onwards; and
- upon reception of an RLC SDU from the RLC layer, the first bit of the RLC SDU shall represent the first bit of the RRC PDU and onwards.

8.3 Basic production

The 'basic production' is obtained by applying UNALIGNED PER to the abstract syntax value (the ASN.1 description) as specified in X.691. It always contains a multiple of 8 bits.

8.4 Extension

The following rules apply with respect to the use of protocol extensions:

- A transmitter compliant with this version of the specification shall, unless explicitly indicated otherwise on a PDU type basis, set the extension part empty. Transmitters compliant with a later version may send non-empty extensions;
- A transmitter compliant with this version of the specification shall set spare bits to zero.

8.5 Padding

If the encoded RRC message does not fill a transport block, the RRC layer shall add padding bits. This applies to PCCH and BCCH.

Padding bits shall be set to 0 and the number of padding bits is a multiple of 8.

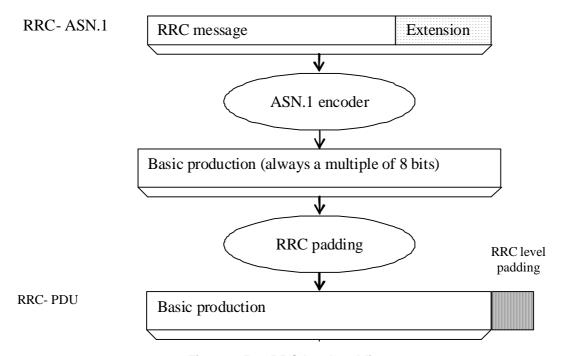


Figure 8.5-1: RRC level padding

9 Specified and default radio configurations

Specified and default configurations are configurations of which the details are specified in the standard. Specified configurations are fixed while default configurations can be modified using dedicated signalling. The default value for the parameters not listed in following clauses shall be set such as the corresponding features are not configured, i.e. *release* or *false* unless explicitly stated otherwise.

NOTE: The UE applies the default values specified in the field description of ASN.1 parameters only when the parent IE is present. Hence, the UE does not apply all default values in field descriptions when it applies the "default radio configuration" in accordance with this clause.

9.1 Specified configurations

9.1.1 Logical channel configurations

9.1.1.1 BCCH configuration

Parameters

Name	Value	Semantics description	Ver
SDAP configuration	Not used		
PDCP configuration	Not used		
RLC configuration	TM		
Logical channel configuration	Not used		

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

9.1.1.2 CCCH configuration

Parameters

Name	Value	Semantics description	Ver
SDAP configuration	Not used		
PDCP configuration	Not used		
RLC configuration	TM		
Logical channel configuration			
>priority	1	Highest priority	
>prioritisedBitRate	infinity		
>bucketSizeDuration	ms1000		
>logicalChannelGroup	0		

9.1.1.3 PCCH configuration

Parameters

Name	Value	Semantics description	Ver
SDAP configuration	Not used		
PDCP configuration	Not used		
RLC configuration	TM		
Logical channel configuration	Not used		

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

9.1.1.4 SCCH configuration

Parameters that are specified for unicast of NR sidelink communication, which is used for the sidelink signalling radio bearer of PC5-RRC message. The SL-SRB using this SCCH configuration is named as SL-SRB3.

Name	Value	Semantics description	Ver
PDCP configuration			
>t-Reordering	Undefined	Selected by the receiving UE, up to UE implementation	
>pdcp-SN-Size	12		
RLC configuration		AM RLC	
>sn-FieldLength	12		
>t-Reassembly	Undefined	Selected by the receiving UE, up to UE implementation	
>t-PollRetransmit	Undefined	Selected by the transmitting UE, up to UE implementation	
>polIPDU	Undefined	Selected by the transmitting UE, up to UE implementation	
>pollByte	Undefined	Selected by the transmitting UE, up to UE implementation	
>maxRetxThreshold	Undefined	Selected by the transmitting UE, up to UE implementation	
>t-StatusProhibit	Undefined	Selected by the receiving UE, up to UE implementation	
>logicalChannelIdentity	3		
MAC configuration			
>priority	1		
>prioritisedBitRate	infinity		
>logicalChannelGroup	0		
>schedulingRequestId	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
>sl-HARQ-FeedbackEnabled	Undefined	Selected by the transmitting UE, up to UE implementation	

Parameters that are specified of NR sidelink communication, which is used for the sidelink signalling radio bearer of unprotected PC5-S message (e.g. Direct Link Establishment Request, TS 24.587 [57] or Prose Direct Link Establishment Request, TS 24.554 [72]). The SL-SRB using this SCCH configuration is named as SL-SRB0.

Name	Value	Semantics description	Ver
PDCP configuration			
>t-Reordering	Undefined	Selected by the receiving UE, up to UE implementation	
>pdcp-SN-Size	12		
RLC configuration		UM RLC	
>sn-FieldLength	6		
>t-Reassembly	Undefined	Selected by the receiving UE, up to UE implementation	
>logicalChannelIdentity	0		
MAC configuration			
>priority	1		
>prioritisedBitRate	infinity		
>logicalChannelGroup	0		
>schedulingRequestId	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
>sl-HARQ-FeedbackEnabled	Undefined	Selected by the transmitting UE, up to UE implementation	

Parameters that are specified for unicast of NR sidelink communication, which is used for the sidelink signalling radio bearer of PC5-S message establishing PC5-S security (e.g. Direct Link Security Mode Command and Direct Link Security Mode Complete, TS 24.587 [57] or ProSe Direct Link Security Mode Command and ProSe Direct Link Security Mode Complete, TS 24.554 [72]). The SL-SRB using this SCCH configuration is named as SL-SRB1.

Name	Value	Semantics description	Ver
PDCP configuration			
>t-Reordering	Undefined	Selected by the receiving UE, up to UE implementation	
>pdcp-SN-Size	12		
RLC configuration		AM RLC	
>sn-FieldLength	12		
>t-Reassembly	Undefined	Selected by the receiving UE, up to UE implementation	
>t-PollRetransmit	Undefined	Selected by the transmitting UE, up to UE implementation	
>polIPDU	Undefined	Selected by the transmitting UE, up to UE implementation	
>pollByte	Undefined	Selected by the transmitting UE, up to UE implementation	
>maxRetxThreshold	Undefined	Selected by the transmitting UE, up to UE implementation	
>t-StatusProhibit	Undefined	Selected by the receiving UE, up to UE implementation	
>logicalChannelIdentity	1		
MAC configuration			
>priority	1		
>prioritisedBitRate	infinity		
>logicalChannelGroup	0		
>schedulingRequestId	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
>sl-HARQ-FeedbackEnabled	Undefined	Selected by the transmitting UE, up to UE implementation	

Parameters that are specified for unicast of NR sidelink communication, which is used for the sidelink signalling radio bearer of protected PC5-S message except Direct Link Security Mode Complete, TS 24.587 [57] or Prose Direct Link Security Mode Complete, TS 24.554 [72]. The SL-SRB using this SCCH configuration is named as SL-SRB2.

Name	Value	Semantics description	Ver
PDCP configuration			
>t-Reordering	Undefined	Selected by the receiving UE, up to UE implementation	
>pdcp-SN-Size	12		
RLC configuration		AM RLC	
>sn-FieldLength	12		
>t-Reassembly	Undefined	Selected by the receiving UE, up to UE implementation	
>t-PollRetransmit	Undefined	Selected by the transmitting UE, up to UE implementation	
>polIPDU	Undefined	Selected by the transmitting UE, up to UE implementation	
>pollByte	Undefined	Selected by the transmitting UE, up to UE implementation	
>maxRetxThreshold	Undefined	Selected by the transmitting UE, up to UE implementation	
>t-StatusProhibit	Undefined	Selected by the receiving UE, up to UE implementation	
>logicalChannelIdentity	2		
MAC configuration			
>priority	1		
>prioritisedBitRate	infinity		
>logicalChannelGroup	0		
>schedulingRequestId	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
>sl-HARQ-FeedbackEnabled	Undefined	Selected by the transmitting UE, up to UE implementation	

Parameters that are specified for NR sidelink discovery, which is used for the sidelink signalling radio bearer of NR sidelink discovery messages (e.g., Announcement message, Solicitation message and Response message, see TS 23.304 [65]). The SL-SRB using this SCCH configuration is named as SL-SRB4.

Name	Value	Semantics description	Ver
PDCP configuration			
>t-Reordering	Undefined	Selected by the receiving UE, up to UE implementation	
>pdcp-SN-Size	12		
RLC configuration		UM RLC	
>sn-FieldLength	6		
>t-Reassembly	Undefined	Selected by the receiving UE, up to UE implementation	
>logicalChannelIdentity	58		
MAC configuration			
>priority	1		
>prioritisedBitRate	infinity		
>logicalChannelGroup	0		
>schedulingRequestId	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
>sl-HARQ-FeedbackEnabled	disabled	HARQ feedback is not supported for NR sidelink discovery transmission	

Parameters that are specified for NR sidelink L2 U2N Relay operations, which is used for the PC5 Relay RLC channel for Remote UE's SRB0 message transmission/reception. The PC5 Relay RLC channel using this configuration is named as SL-RLC0.

Name	Value	Semantics description	Ver
RLC configuration		AM	
>sn-FieldLength	12		
>t-Reassembly	Undefined	Selected by the receving UE, up to UE implementation	
>t-PollRetransmit	Undefined	Selected by the transmitting UE, up to UE implementation	
>polIPDU	Undefined	Selected by the transmitting UE, up to UE implementation	
>pollByte	Undefined	Selected by the transmitting UE, up to UE implementation	
>maxRetxThreshold	Undefined	Selected by the transmitting UE, up to UE implementation	
>t-StatusProhibit	Undefined	Selected by the receiving UE, up to UE implementation	
>logicalChannelIdentity	56		
MAC configuration			
>priority	1		
>proritisedBitRate	Inifinity		
>logicalChannelGroup	0		
>schedulingRequestId	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network. The scheduling request configuration is not applicable to L2 U2N Remote UE.	
>sl-HARQ-FeedbackEnabled	Undefined	Selected by the transmitting UE, up to UE implementation	

9.1.1.5 STCH configuration

Parameters that are specified for NR sidelink communication, which is used for the sidelink data radio bearer.

Name	Value	Semantics description	Ver
PDCP configuration			
>t-Reordering	Undefined	Selected by the receiving UE, up to UE implementation	
>pdcp-SN-Size	12	For broadcast and groupcast of NR sidelink communication	
>maxCID	15	For broadcast and groupcast of NR sidelink communication	
>profiles			
RLC configuration		For broadcast and groupcast of NR sidelink communication, unidirectional UM RLC UM window size is set to 32	
>t-Reassembly	Undefined	Selected by the receiving UE, up to Up to UE implementation	
>sn-FieldLength	6	For broadcast and groupcast of NR sidelink communication	
>logicalChannelIdentity	Undefined	Selected by the transmitting UE, up to UE implementation	
MAC configuration			
>priority			

9.1.1.6 MCCH configuration

Parameters that are specified for MCCH.

Name	Value	Semantics description	Ver
RLC configuration		UM RLC	
>sn-FieldLength	6		
>t-Reassembly	ms0		

9.1.1.7 MTCH configuration for MBS broadcast

Parameters that are specified for MBS broadcast MTCH.

Name	Value	Semantics description	Ver
PDCP configuration			
>t-Reordering	ms0		
>pdcp-SN-SizeDL	18		
RLC configuration		UM RLC	
>sn-FieldLength	12		
>t-Reassembly	ms0		

9.1.2 Void

9.2 Default radio configurations

The following clauses only list default values for REL-15 parameters included in protocol version v15.3.0. For all fields introduced in a later protocol version, the default value is "released" or "false" unless explicitly specified otherwise. If the UE is to apply default configuration while it is configured with some critically extended fields, the UE shall apply the original version of those fields with only default values.

NOTE 1: In general, the signalling should preferably support a "release" option for fields introduced after v15.3.0. The "value not applicable" should be used restrictively, mainly limited to for fields which value is relevant only if another field is set to a value other than its default.

NOTE 2: For parameters in ServingCellConfig, the default values are specified in the corresponding specification.

9.2.1 Default SRB configurations

Parameters

Name		Value		Semantics description	Ver
	SRB1	SRB2	SRB3		
PDCP-Config					
>t-Reordering	infinity				
RLC-Config CHOICE	Am				
ul-AM-RLC					
>sn-FieldLength	size12				
>t-PollRetransmit	ms45				
>polIPDU	infinity				
>pollByte	infinity				
>maxRetxThreshold	t8				
dI-AM-RLC					
>sn-FieldLength	size12				
>t-Reassembly	ms35				
>t-StatusProhibit	ms0				
logicalChannelIdentity	1	2	3		
LogicalChannelConfig					
>priority	1	3	1		
>prioritisedBitRate	infinity				
>logicalChannelGroup	0				

9.2.2 Default MAC Cell Group configuration

Parameters

Name	Value	Semantics description	Ver
MAC Cell Group configuration			
bsr-Config			
>periodicBSR-Timer	sf10		
>retxBSR-Timer	sf80		
phr-Config			
>phr-PeriodicTimer	sf10		
>phr-ProhibitTimer	sf10		
>phr-Tx-PowerFactorChange	dB1		

9.2.3 Default values timers and constants

Parameters

Name	Value	Semantics description	Ver
t310	ms1000		
n310	n1		
t311	ms30000		
n311	n1		

9.2.4 Default PC5 Relay RLC Channel

Parameters of the PC5 Relay RLC Channel used for Remote UE's SRB1 RRC message transmission and reception. The PC5 Relay RLC Channel using this configuration is named as SL-RLC1.

Name	Value	Semantics description	Ver
RLC configuration		AM	
>sn-FieldLength	12		
>t-Reassembly	Undefined	Selected by the receving UE, up to UE implementation	
>t-PollRetransmit	Undefined	Selected by the transmitting UE, up to UE implementation	
>pollPDU	Undefined	Selected by the transmitting UE, up to UE implementation	
>pollByte	Undefined	Selected by the transmitting UE, up to UE implementation	
>maxRetxThreshold	Undefined	Selected by the transmitting UE, up to UE implementation	
>t-StatusProhibit	Undefined	Selected by the receiving UE, up to UE implementation	
>logicalChannelIdentity	57		
MAC configuration			
>priority	1		
>proritisedBitRate	Inifinity		
>logicalChannelGroup	0		
>schedulingRequestId	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	

9.2.5 Default SRAP configurations

Parameters that are used for reception of Remote UE's *RRCResume*, *RRCRelease* in response to an *RRCResumeRequest* and *RRCRestablishment* messages.

Name	Value	Semantics description	Ver
SL SRAP Config			
> sl-LocalIdentity	Undefined	SRAP PDUs with any local Identity will be submitted to the SRB1 PDCP entity.	
> sI-RemoteUE-RB-Identity	SRB1		

9.3 Sidelink pre-configured parameters

This ASN.1 segment is the start of the NR definitions of pre-configured sidelink parameters.

NR-Sidelink-Preconf

```
-- ASN1START
-- TAG-NR-SIDELINK-PRECONF-DEFINITIONS-START
NR-Sidelink-Preconf DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
IMPORTS
    SL-RemoteUE-Config-r17,
    SL-DRX-ConfigGC-BC-r17,
    SL-FreqConfigCommon-r16,
    SL-RadioBearerConfig-r16,
    SL-RLC-BearerConfig-r16,
    SL-EUTRA-AnchorCarrierFregList-r16,
    SL-NR-AnchorCarrierFreqList-r16,
    SL-MeasConfigCommon-r16,
    SL-UE-SelectedConfig-r16,
   TDD-UL-DL-ConfigCommon,
   maxNrofFreqSL-r16,
   maxNrofSLRB-r16,
    maxSL-LCID-r16
FROM NR-RRC-Definitions;
-- TAG-NR-SIDELINK-PRECONF-DEFINITIONS-STOP
-- ASN1STOP
```

SL-PreconfigurationNR

The IE *SL-PreconfigurationNR* includes the sidelink pre-configured parameters used for NR sidelink communication. Need codes or conditions specified for subfields in *SL-PreconfigurationNR* do not apply.

SL-PreconfigurationNR information elements

```
-- ASN1START
-- TAG-SL-PRECONFIGURATIONNR-START

SL-PreconfigurationNR-r16 ::= SEQUENCE {
    sidelinkPreconfigNR-r16 SidelinkPreconfigNR-r16,
    ...
}
```

```
SidelinkPreconfigNR-r16 ::=
                                             SEQUENCE {
    sl-PreconfigFregInfoList-r16
                                                 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfigCommon-r16
                                                                                                                         OPTIONAL.
                                                                                                                         OPTIONAL,
    sl-PreconfigNR-AnchorCarrierFregList-r16
                                                 SL-NR-AnchorCarrierFreqList-r16
    sl-PreconfiqEUTRA-AnchorCarrierFreqList-r16 SL-EUTRA-AnchorCarrierFreqList-r16
                                                                                                                         OPTIONAL,
    sl-RadioBearerPreConfigList-r16
                                                 SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SL-RadioBearerConfig-r16
                                                                                                                         OPTIONAL,
    sl-RLC-BearerPreConfigList-r16
                                                 SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfig-r16
                                                                                                                         OPTIONAL,
                                                 SL-MeasConfigCommon-r16
    sl-MeasPreConfig-r16
                                                                                                                         OPTIONAL,
    sl-OffsetDFN-r16
                                                 INTEGER (1..1000)
                                                                                                                         OPTIONAL,
    t400-r16
                                                 ENUMERATED [ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000] OPTIONAL,
    sl-MaxNumConsecutiveDTX-r16
                                                 ENUMERATED {n1, n2, n3, n4, n6, n8, n16, n32}
                                                                                                                         OPTIONAL,
    sl-SSB-PriorityNR-r16
                                                 INTEGER (1..8)
                                                                                                                         OPTIONAL,
    sl-PreconfigGeneral-r16
                                                 SL-PreconfigGeneral-r16
                                                                                                                         OPTIONAL,
    sl-UE-SelectedPreConfig-r16
                                                 SL-UE-SelectedConfig-r16
                                                                                                                         OPTIONAL.
    sl-CSI-Acquisition-r16
                                                 ENUMERATED {enabled}
                                                                                                                         OPTIONAL,
    sl-RoHC-Profiles-r16
                                                 SL-RoHC-Profiles-r16
                                                                                                                         OPTIONAL,
    sl-MaxCID-r16
                                                 INTEGER (1..16383)
                                                                                                                         DEFAULT 15,
    [ [
    sl-DRX-PreConfigGC-BC-r17
                                                 SL-DRX-ConfigGC-BC-r17
                                                                                                                        OPTIONAL,
    sl-TxProfileList-r17
                                                 SL-TxProfileList-r17
                                                                                                                         OPTIONAL,
    sl-PreconfigDiscConfig-r17
                                                                                                                         OPTIONAL
                                                 SL-RemoteUE-Config-r17
    11
SL-TxProfileList-r17 ::=
                                             SEQUENCE (SIZE (1..256)) OF SL-TxProfile-r17
SL-TxProfile-r17 ::=
                                             ENUMERATED {drx-Compatible, drx-Incompatible, spare6, spare5, spare4, spare3, spare2, spare1}
SL-PreconfigGeneral-r16 ::=
                                             SEOUENCE {
    sl-TDD-Configuration-r16
                                                 TDD-UL-DL-ConfigCommon
                                                                                                                         OPTIONAL,
    reservedBits-r16
                                                 BIT STRING (SIZE (2))
                                                                                                                         OPTIONAL,
    . . .
SL-RoHC-Profiles-r16 ::=
                                       SEOUENCE {
    profile0x0001-r16
                                           BOOLEAN,
    profile0x0002-r16
                                           BOOLEAN,
    profile0x0003-r16
                                           BOOLEAN,
    profile0x0004-r16
                                           BOOLEAN,
    profile0x0006-r16
                                           BOOLEAN,
    profile0x0101-r16
                                           BOOLEAN,
    profile0x0102-r16
                                           BOOLEAN,
    profile0x0103-r16
                                           BOOLEAN,
    profile0x0104-r16
                                           BOOLEAN
-- TAG-SL-PRECONFIGURATIONNR-STOP
-- ASN1STOP
```

SL-PreconfigurationNR field descriptions

sI-DRX-PreConfig-GC-BC

This field indicates the sidelink DRX configuration for groupcast and broadcast communication, as specified in TS 38.321 [3].

sI-OffsetDFN

Indicates the timing offset for the UE to determine DFN timing when GNSS is used for timing reference. Value 1 corresponds to 0.001 milliseconds, value 2 corresponds to 0.002 milliseconds, and so on. If the field is absent, no offset is applied.

sI-PreconfigDiscConfig

This field indicates the configuration for discovery message transmission used by NR sidelink U2N Remote UE.

sI-PreconfigEUTRA-AnchorCarrierFregList

This field indicates the EUTRA anchor carrier frequency list, which can provide the NR sidelink communication configuration.

sI-PreconfigFreqInfoList

This field indicates the NR sidelink communication and/ or NR sidelink discovery configuration some carrier frequency(ies). In this release, only one *SL-FreqConfig* can be configured in the list.

sl-PreconfigNR-AnchorCarrierFreqList

This field indicates the NR anchor carrier frequency list, which can provide the NR sidelink communication configuration.

sl-RadioBearerPreConfigList

This field indicates one or multiple sidelink radio bearer configurations.

sI-RLC-BearerPreConfigList

This field indicates one or multiple sidelink RLC bearer configurations.

sI-RoHC-Profiles

This field indicates the supported RoHC profiles for NR sidelink communications.

sI-SSB-PriorityNR

This field indicates the priority of NR sidelink SSB transmission and reception.

sl-TxProfileList

List of one or multiple Tx profiles, which are indicated by upper layer in order of increasing Tx profile pointer identities, indicate the compatibility of supporting SL DRX as specified in TS 38.321 [3].

End of NR-Sidelink-Preconf

-- ASN1START

END

-- ASN1STOP

9.4 Radio Information Related to Discovery Message

This clause specifies RRC information elements that are transferred in Discovery Message.

SL-AccessInfo-L2U2N

The IE SL-AccessInfo-L2U2N includes the radio information included in Discovery Message used for L2 U2N relay operation.

SL-AccessInfo-L2U2N information elements

```
-- ASN1START
-- TAG-SL-ACCESSINFO-L2U2N-START
NR-Sidelink-DiscoveryMessage DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
IMPORTS
    CellAccessRelatedInfo,
    SL-ServingCellInfo-r17
FROM NR-RRC-Definitions;
SL-AccessInfo-L2U2N-r17 ::=
                                        SEQUENCE {
    cellAccessRelatedInfo-r17
                                            CellAccessRelatedInfo,
    sl-ServingCellInfo-r17
                                            SL-ServingCellInfo-r17,
    . . .
END
-- TAG-SL-ACCESSINFO-L2U2N-STOP
-- ASN1STOP
```

10 Generic error handling

10.1 General

The generic error handling defined in the subsequent clauses applies unless explicitly specified otherwise e.g. within the procedure specific error handling.

The UE shall consider a value as not comprehended when it is set:

- to an extended value that is not defined in the version of the transfer syntax supported by the UE;
- to a spare or reserved value unless the specification defines specific behaviour that the UE shall apply upon receiving the concerned spare/reserved value.

The UE shall consider a field as not comprehended when it is defined:

- as spare or reserved unless the specification defines specific behaviour that the UE shall apply upon receiving the concerned spare/reserved field.

10.2 ASN.1 violation or encoding error

The UE shall:

- 1> when receiving an RRC message on the BCCH, CCCH, PCCH, MCCH or a PC5 RRC message on SBCCH for which the abstract syntax is invalid [6]:
 - 2> ignore the message.

NOTE: This clause applies in case one or more fields is set to a value, other than a spare, reserved or extended value, not defined in this version of the transfer syntax. E.g. in the case the UE receives value 12 for a field defined as INTEGER (1..11). In cases like this, it may not be possible to reliably detect which field is in the error hence the error handling is at the message level.

10.3 Field set to a not comprehended value

The UE shall, when receiving an RRC message or PC5 RRC message on any logical channel:

- 1> if the message includes a field that has a value that the UE does not comprehend:
 - 2> if a default value is defined for this field:
 - 3> treat the message while using the default value defined for this field;
 - 2> else if the concerned field is optional:
 - 3> treat the message as if the field were absent and in accordance with the need code for absence of the concerned field;
 - 2> else:
 - 3> treat the message as if the field were absent and in accordance with clause 10.4.

10.4 Mandatory field missing

The UE shall:

1> if the message includes a field that is mandatory to include in the message (e.g. because conditions for mandatory presence are fulfilled) and that field is absent or treated as absent:

- 2> if the RRC message was not received on DCCH or CCCH; or
- 2> if the PC5 RRC message was not received on SCCH:
 - 3> if the field concerns a (sub-field of) an entry of a list (i.e. a SEQUENCE OF):
 - 4> treat the list as if the entry including the missing or not comprehended field was absent;
 - 3> else if the field concerns a sub-field of another field, referred to as the 'parent' field i.e. the field that is one nesting level up compared to the erroneous field:
 - 4> consider the 'parent' field to be set to a not comprehended value;
 - 4> apply the generic error handling to the subsequent 'parent' field(s), until reaching the top nesting level i.e. the message level;
 - 3> else (field at message level):
 - 4> ignore the message.
- NOTE 1: The error handling defined in these clauses implies that the UE ignores a message with the message type or version set to a not comprehended value.
- NOTE 2: The nested error handling for messages received on logical channels other than DCCH, CCCH and SCCH applies for errors in extensions also, even for errors that can be regarded as invalid network operation e.g. the network not observing conditional presence.
- NOTE 3: UE behaviour on receipt of an RRC message on DCCH or CCCH or a PC5 RRC message on SCCH that does not include a field that is mandatory (e.g. because conditions for mandatory presence are fulfilled) is unspecified.

The following ASN.1 further clarifies the levels applicable in case of nested error handling for errors in extension fields.

```
-- /example/ ASN1START
-- Example with extension addition group
TtemInfoList ::=
                                SEQUENCE (SIZE (1..max)) OFItemInfo
                   SEQUENCE {
    INTEGER
    Field1
ItemInfo ::=
   itemIdentity
                                   INTEGER (1..max),
                                    Field1,
   field1
                                                         OPTIONAL,
                                                                           -- Need N
   field2
                                    Field2
   11
                                                                        -- Cond Cond1
                     Field3-r9 OPTIONAL,
Field4-r9 OPTIONAL
   field3-r9
   field4-r9
                                                                           -- Need N
   ]]
}
-- Example with traditional non-critical extension (empty sequence)
INTEGER (1..max),
                                    Field1, OPTIONAL,
   field2
                                                                             -- Need N
   nonCriticalExtension
                                   BroadcastInfoBlock1-v940-IES OPTIONAL
}
BroadcastInfoBlock1-v940-IEs::= SEQUENCE {
               Field3-r9 OPTIONAL, -- Cond Cond1
Field4-r9 OPTIONAL, -- Need N

stension SEQUENCE {} OPTIONAL -- Need S
   field3-r9
   field4-r9
   nonCriticalExtension
}
-- ASN1STOP
```

The UE shall, apply the following principles regarding the levels applicable in case of nested error handling:

- an extension addition group is not regarded as a level on its own. E.g. in the ASN.1 extract in the previous, a error regarding the conditionality of *field3* would result in the entire itemInfo entry to be ignored (rather than just the extension addition group containing *field3* and *field4*);
- a traditional *nonCriticalExtension* is not regarded as a level on its own. E.g. in the ASN.1 extract in the previous, an error regarding the conditionality of *field3* would result in the entire *BroadcastInfoBlock1* to be ignored (rather than just the non-critical extension containing *field3* and *field4*).

10.5 Not comprehended field

The UE shall, when receiving an RRC message on any logical channel:

- 1> if the message includes a field that the UE does not comprehend:
 - 2> treat the rest of the message as if the field was absent.

NOTE: This clause does not apply to the case of an extension to the value range of a field. Such cases are addressed instead by the requirements in clause 10.3.

11 Radio information related interactions between network nodes

11.1 General

This clause specifies RRC messages that are transferred between network nodes. These RRC messages may be transferred to or from the UE via another Radio Access Technology. Consequently, these messages have similar characteristics as the RRC messages that are transferred across the NR radio interface, i.e. the same transfer syntax and protocol extension mechanisms apply.

11.2 Inter-node RRC messages

11.2.1 General

This clause specifies RRC messages that are sent either across the X2-, Xn- or the NG-interface, either to or from the gNB, i.e. a single 'logical channel' is used for all RRC messages transferred across network nodes. The information could originate from or be destined for another RAT.

```
-- ASN1START
-- TAG-NR-INTER-NODE-DEFINITIONS-START
NR-InterNodeDefinitions DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
IMPORTS
    ARFCN-ValueNR,
   ARFCN-ValueEUTRA,
    CellIdentity,
    CGI-InfoEUTRA,
    CGI-InfoNR,
    CondReconfigExecCondSCG-r17,
    CSI-RS-Index,
    CSI-RS-CellMobility,
    DRX-Config,
    EUTRA-PhysCellId,
    FeatureSetDownlinkPerCC-Id,
    FeatureSetUplinkPerCC-Id,
    FreqBandIndicatorNR,
    GapConfig,
    maxBandComb,
    maxBands.
    maxBandsEUTRA,
    maxCellSFTD,
    maxFeatureSetsPerBand,
    maxFreq,
    maxFreqIDC-MRDC,
```

```
maxNrofCombIDC,
   maxNrofCondCells-r16,
   maxNrofCondCells-1-r17,
   maxNrofPhysicalResourceBlocks,
   maxNrofSCells,
    maxNrofServingCells,
   maxNrofServingCells-1,
    maxNrofServingCellsEUTRA,
   maxNrofIndexesToReport,
   maxSimultaneousBands,
   MBSInterestIndication-r17,
   MeasQuantityResults,
   MeasResultCellListSFTD-EUTRA,
   MeasResultCellListSFTD-NR.
   MeasResultList2NR,
   MeasResultSCG-Failure,
   MeasResultServFreqListEUTRA-SCG,
   NeedForGapsInfoNR-r16,
   NeedForGapNCSG-InfoNR-r17,
    NeedForGapNCSG-InfoEUTRA-r17,
    OverheatingAssistance,
    OverheatingAssistance-r17,
    P-Max,
    PhysCellId,
    RadioBearerConfig,
    RAN-NotificationAreaInfo,
    RRCReconfiguration,
    ServCellIndex,
    SetupRelease,
    SSB-Index,
    SSB-MTC,
    SSB-ToMeasure,
    SS-RSSI-Measurement,
    ShortMAC-I,
    SubcarrierSpacing,
    UEAssistanceInformation,
    UE-CapabilityRAT-ContainerList,
    maxNrofCLI-RSSI-Resources-r16,
    maxNrofCLI-SRS-Resources-r16,
    RSSI-ResourceId-r16,
    SDT-Config-r17,
    SidelinkUEInformationNR-r16,
    SRS-ResourceId,
    UE-RadioPagingInfo-r17
FROM NR-RRC-Definitions;
-- TAG-NR-INTER-NODE-DEFINITIONS-STOP
-- ASN1STOP
```

11.2.2 Message definitions

CG-CandidateList

This message is used to transfer the SCG radio configuration for one or more candidate cells for Conditional PSCell Addition (CPA) or Conditional PSCell Change (CPC) as generated by the candidate target SgNB.

Direction: Secondary gNB to master gNB or eNB.

CG-CandidateList message

```
-- ASN1START
-- TAG-CG-CANDIDATELIST-START
CG-CandidateList ::=
                                    SEOUENCE {
    criticalExtensions
                                        CHOICE {
       c1
            cg-CandidateList-r17
                                                CG-CandidateList-r17-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                            SEQUENCE {}
CG-CandidateList-r17-IEs ::=
                                    SEOUENCE {
    cg-CandidateToAddModList-r17
                                        SEQUENCE (SIZE (1..maxNrofCondCells-r16)) OF CG-CandidateInfo-r17
                                                                                                              OPTIONAL,
                                        SEQUENCE (SIZE (1..maxNrofCondCells-r16)) OF CG-CandidateInfoId-r17 OPTIONAL,
    cg-CandidateToReleaseList-r17
    nonCriticalExtension
                                        SEQUENCE {}
                                                                                                              OPTIONAL
CG-CandidateInfo-r17 ::=
                                    SEQUENCE {
    cg-CandidateInfoId-r17
                                        CG-CandidateInfoId-r17,
    candidateCG-Config-r17
                                       OCTET STRING (CONTAINING CG-Config)
CG-CandidateInfoId-r17::=
                                    SEOUENCE {
    ssbFrequency-r17
                                        ARFCN-ValueNR,
    physCellId-r17
                                        PhysCellId
-- TAG-CG-CANDIDATELIST-STOP
-- ASN1STOP
```

CG-CandidateList field descriptions

cg-CandidateToAddModList

Contains information regarding candidate target cells to be added or modified for Conditional PSCell Addition (CPA) or Conditional PSCell Change (CPC) from the candidate target secondary node to the master node.

cg-CandidateToReleaseList

Contains information regarding candidate target cells for CPA or CPC to be removed from the candidate target secondary node to the master node. This list is not used in CPA or CPC preparation.

CG-CandidateInfo field descriptions

cg-CandidateInfold

SSB frequency and Physical Cell Identity of the candidate target cell.

candidateCG-Config

CG-Config message corresponding to the cell indicated by cg-CandidateInfold.

HandoverCommand

This message is used to transfer the handover command as generated by the target gNB.

Direction: target gNB to source gNB/source RAN.

HandoverCommand message

```
-- ASN1START
-- TAG-HANDOVER-COMMAND-START
HandoverCommand ::=
                                  SEQUENCE {
   criticalExtensions
                                      CHOICE {
       c1
                                          CHOICE {
           handoverCommand
                                             HandoverCommand-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                 SEQUENCE {}
HandoverCommand-IEs ::=
                                  SEQUENCE {
   handoverCommandMessage
                                      OCTET STRING (CONTAINING RRCReconfiguration),
   nonCriticalExtension
                                      SEOUENCE {}
                                                                                       OPTIONAL
-- TAG-HANDOVER-COMMAND-STOP
-- ASN1STOP
```

HandoverCommand field descriptions

handoverCommandMessage

Contains the RRCReconfiguration message used to perform handover within NR or handover to NR, as generated (entirely) by the target gNB.

HandoverPreparationInformation

This message is used to transfer the NR RRC information used by the target gNB during handover preparation or UE context retrieval, e.g. in case of resume or reestablishment, including UE capability information. This message is also used for transferring the information between the CU and DU.

Direction: source gNB/source RAN to target gNB or CU to DU.

HandoverPreparationInformation message

```
-- ASN1START
-- TAG-HANDOVER-PREPARATION-INFORMATION-START
HandoverPreparationInformation ::=
                                       SEOUENCE {
    criticalExtensions
                                           CHOICE {
                                               CHOICE {
           handoverPreparationInformation
                                                    HandoverPreparationInformation-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                           SEQUENCE {}
HandoverPreparationInformation-IEs ::= SEQUENCE {
    ue-CapabilityRAT-List
                                           UE-CapabilityRAT-ContainerList,
    sourceConfig
                                           AS-Config
                                                                                            OPTIONAL, -- Cond HO
   rrm-Config
                                           RRM-Config
                                                                                            OPTIONAL,
    as-Context
                                           AS-Context
                                                                                            OPTIONAL,
    nonCriticalExtension
                                           SEOUENCE {}
                                                                                            OPTIONAL
AS-Config ::=
                                       SEQUENCE {
    rrcReconfiguration
                                            OCTET STRING (CONTAINING RRCReconfiguration),
    11
    sourceRB-SN-Config
                                           OCTET STRING (CONTAINING RadioBearerConfig)
                                                                                            OPTIONAL,
    sourceSCG-NR-Config
                                           OCTET STRING (CONTAINING RRCReconfiguration)
                                                                                            OPTIONAL,
    sourceSCG-EUTRA-Config
                                           OCTET STRING
                                                                                            OPTIONAL
    11,
    [ [
    sourceSCG-Configured
                                            ENUMERATED {true}
                                                                                            OPTIONAL
    ]],
    [ [
    sdt-Config-r17
                                            SDT-Config-r17
                                                                                            OPTIONAL
```

```
SEQUENCE {
AS-Context ::=
    reestablishment.Info
                                            ReestablishmentInfo
                                                                                                  OPTIONAL,
    configRestrictInfo
                                            ConfigRestrictInfoSCG
                                                                                                  OPTIONAL,
    [[ ran-NotificationAreaInfo
                                            RAN-NotificationAreaInfo
                                                                                                  OPTIONAL
    ]],
    [[ ueAssistanceInformation
                                            OCTET STRING (CONTAINING UEAssistanceInformation)
                                                                                                  OPTIONAL
                                                                                                            -- Cond HO2
    11,
    11
    selectedBandCombinationSN
                                            BandCombinationInfoSN
                                                                                                  OPTIONAL
    11,
    11
                                            ConfigRestrictInfoDAPS-r16
    configRestrictInfoDAPS-r16
                                                                                                  OPTIONAL,
    sidelinkUEInformationNR-r16
                                            OCTET STRING
                                                                                                  OPTIONAL,
    sidelinkUEInformationEUTRA-r16
                                            OCTET STRING
                                                                                                  OPTIONAL,
    ueAssistanceInformationEUTRA-r16
                                            OCTET STRING
                                                                                                  OPTIONAL,
    ueAssistanceInformationSCG-r16
                                            OCTET STRING (CONTAINING UEAssistanceInformation)
                                                                                                  OPTIONAL,
                                                                                                              -- Cond HO2
    needForGapsInfoNR-r16
                                            NeedForGapsInfoNR-r16
                                                                                                  OPTIONAL
    ]],
    ] ]
    configRestrictInfoDAPS-v1640
                                            ConfigRestrictInfoDAPS-v1640
                                                                                                  OPTIONAL
    ]],
    11
    needForGapNCSG-InfoNR-r17
                                            NeedForGapNCSG-InfoNR-r17
                                                                                                  OPTIONAL,
    needForGapNCSG-InfoEUTRA-r17
                                            NeedForGapNCSG-InfoEUTRA-r17
                                                                                                  OPTIONAL,
    mbsInterestIndication-r17
                                            OCTET STRING (CONTAINING MBSInterestIndication-r17) OPTIONAL
    ]]
ConfigRestrictInfoDAPS-r16 ::=
                                        SEOUENCE {
    powerCoordination-r16
                                            SEQUENCE {
        p-DAPS-Source-r16
                                                 P-Max,
        p-DAPS-Target-r16
                                                 P-Max,
        uplinkPowerSharingDAPS-Mode-r16
                                                  ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic }
                                                                                                              OPTIONAL
ConfigRestrictInfoDAPS-v1640 ::=
                                    SEOUENCE
                                        FeatureSetDownlinkPerCC-Id,
    sourceFeatureSetPerDownlinkCC-r16
    sourceFeatureSetPerUplinkCC-r16
                                         FeatureSetUplinkPerCC-Id
ReestablishmentInfo ::=
                                     SEOUENCE {
    sourcePhysCellId
                                             PhysCellId,
    targetCellShortMAC-I
                                            ShortMAC-I,
    additionalReestabInfoList
                                            ReestabNCellInfoList
                                                                                              OPTIONAL
ReestabNCellInfoList ::=
                                     SEQUENCE ( SIZE (1..maxCellPrep) ) OF ReestabNCellInfo
ReestabNCellInfo::= SEQUENCE{
    cellIdentity
                                            CellIdentity,
    key-gNodeB-Star
                                            BIT STRING (SIZE (256)),
    shortMAC-I
                                            ShortMAC-I
```

```
RRM-Config ::=
                           SEQUENCE {
    ue-InactiveTime
                                ENUMERATED {
                                    s1, s2, s3, s5, s7, s10, s15, s20,
                                    s25, s30, s40, s50, min1, min1s20, min1s40,
                                    min2, min2s30, min3, min3s30, min4, min5, min6,
                                    min7, min8, min9, min10, min12, min14, min17, min20,
                                    min24, min28, min33, min38, min44, min50, hr1,
                                    hrlmin30, hr2, hr2min30, hr3, hr3min30, hr4, hr5, hr6,
                                    hr8, hr10, hr13, hr16, hr20, day1, day1hr12, day2,
                                    day2hr12, day3, day4, day5, day7, day10, day14, day19,
                                    day24, day30, dayMoreThan30}
                                                                                            OPTIONAL,
    candidateCellInfoList
                                MeasResultList2NR
                                                                                            OPTIONAL,
    ] ]
    candidateCellInfoListSN-EUTRA
                                       MeasResultServFreqListEUTRA-SCG
                                                                                            OPTIONAL
-- TAG-HANDOVER-PREPARATION-INFORMATION-STOP
-- ASN1STOP
```

HandoverPreparationInformation field descriptions

as-Context

Local RAN context required by the target gNB or DU.

rrm-Config

Local RAN context used mainly for RRM purposes.

sourceConfig

The radio resource configuration as used in the source cell.

ue-CapabilityRAT-List

The UE radio access related capabilities concerning RATs supported by the UE. A gNB that retrieves MRDC related capability containers ensures that the set of included MRDC containers is consistent w.r.t. the feature set related information.

ue-InactiveTime

Duration while UE has not received or transmitted any user data. Thus the timer is still running in case e.g., UE measures the neighbour cells for the HO purpose. Value s1 corresponds to 1 second, s2 corresponds to 2 seconds and so on. Value min1 corresponds to 1 minute, value min1s20 corresponds to 1 minute and 20 seconds, value min1s40 corresponds to 1 minute and 40 seconds and so on. Value hr1 corresponds to 1 hour, hr1min30 corresponds to 1 hour and 30 minutes and so on.

AS-Config field descriptions

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rrcReconfiguration

Contains the RRCReconfiguration configuration as generated entirely by the MN.

sdt-Config

Contains the IE SDT-Config as generated entirely by the last serving gNB. This field is only used during the SDT procedure with UE context relocation as defined in TS 38.300 [2], clause 18.2.

sourceRB-SN-Config

Contains the IE RadioBearerConfig as generated entirely by the SN. This field is only used when the UE is configured with SN terminated RB(s).

sourceSCG-Configured

Value *true* indicates that the UE is configured with NR or EUTRA SCG in source configuration. The field is only used in NR-DC and NE-DC and is included only if the fields *sourceSCG-NR-Config* and *sourceSCG-EUTRA-Config* are absent.

sourceSCG-EUTRA-Config

Contains the current dedicated SCG configuration in *RRCConnectionReconfiguration* message as specified in TS 36.331 [10] and generated entirely by the SN. In this version of the specification, the E-UTRA *RRCConnectionReconfiguration* message can only include the field *scg-Configuration*. This field is only used in NE-DC.

sourceSCG-NR-Config

Contains the current dedicated SCG configuration in *RRCReconfiguration* message as generated entirely by the SN. In this version of the specification, the *RRCReconfiguration* message can only include fields *secondaryCellGroup* and *measConfig.* This field is only used in NR-DC.

AS-Context field descriptions

configRestrictInfoDAPS

Includes fields for which source cell explicitly indicates the restriction to be observed by target cell during DAPS handover.

mbsInterestIndication

Includes the information last reported by the UE in the NR MBSInterestIndication message, where the plmn-Index (if included by the UE in tmgi) is replaced by the PLMN ID, if any.

needForGapsInfoNR

Includes measurement gap requirement information of the UE for NR target bands.

selectedBandCombinationSN

Indicates the band combination selected by SN in (NG)EN-DC, NE-DC, and NR-DC.

sidelinkUEInformationEUTRA

This field includes SidelinkUEInformation IE as specified in TS 36.331 [10].

sidelinkUEInformationNR

This field includes SidelinkUEInformationNR IE.

ueAssistanceInformation

Includes for each UE assistance feature the information last reported by the UE, if any.

ueAssistanceInformationSCG

Includes for each UE assistance feature associated with the SCG, the information last reported by the UE in the NR UEAssistanceInformation message for the SCG, if any.

ConfigRestrictInfoDAPS field descriptions

sourceFeatureSetPerUplinkCC/sourceFeatureSetPerDownlinkCC

Indicates an index referring to the position of the FeatureSetUplinkPerCC/FeatureSetDownlinkPerCC selected by source in the featureSetsUplinkPerCC/featureSetsDownlinkPerCC.

RRM-Config field descriptions

candidateCellInfoList

A list of the best cells on each frequency for which measurement information was available

candidateCellInfoListSN-EUTRA

A list of EUTRA cells including serving cells and best neighbour cells on each serving frequency, for which measurement results were available. This field is only used in NEDC.

Conditional Presence	Explanation
НО	The field is mandatory present in case of handover within NR or UE context retrieval, e.g. in case of resume or re-
	establishment. The field is optionally present in case of handover from E-UTRA/5GC. Otherwise the field is absent.
HO2	The field is optionally present in case of handover within NR; otherwise the field is absent.

NOTE 1: The following table indicates per source RAT whether RAT capabilities are included or not.

Source RAT	NR capabilities	E-UTRA capabilities	MR-DC capabilities	UTRA capabilities
NR	May be included if UE Radio Capability ID as specified in 23.502 [43] is used for	May be included	May be included	May be included, ignored by gNB if received
	the UE. Included otherwise.			
E-UTRAN	May be included if UE Radio Capability ID as specified in 23.502 [43] is used for the UE. Included otherwise.	May be included	May be included	May be included, ignored by gNB if received

NOTE 2: The following table indicates, in case of inter-RAT handover from E-UTRA, which additional IEs are included or not:

Source system	sourceConfig	rrm-Config	as-Context
E-UTRA/EPC	Not included	May be included	Not included
E-UTRA/5GC	May be included, but only radioBearerConfig is included in the RRCReconfiguration.	May be included	Not included

CG-Config

This message is used to transfer the SCG radio configuration as generated by the SgNB or SeNB. It can also be used by a CU to request a DU to perform certain actions, e.g. to request the DU to perform a new lower layer configuration.

Direction: Secondary gNB or eNB to master gNB or eNB, alternatively CU to DU.

CG-Config message

```
-- TAG-CG-CONFIG-START
CG-Config ::=
                                 SEQUENCE {
    criticalExtensions
                                        CHOICE .
        c1
                                             CHOICE {
                                                 CG-Config-IEs,
            cq-Confiq
            spare3 NULL, spare2 NULL, spare1 NULL
        criticalExtensionsFuture
                                             SEQUENCE {}
CG-Config-IEs ::=
                                     SEOUENCE {
    scq-CellGroupConfiq
                                         OCTET STRING (CONTAINING RRCReconfiguration)
                                                                                          OPTIONAL.
    scq-RB-Confiq
                                         OCTET STRING (CONTAINING RadioBearerConfig)
                                                                                          OPTIONAL,
    configRestrictModReg
                                         ConfigRestrictModRegSCG
                                                                                          OPTIONAL,
    drx-InfoSCG
                                         DRX-Info
                                                                                          OPTIONAL,
    candidateCellInfoListSN
                                        OCTET STRING (CONTAINING MeasResultList2NR)
                                                                                          OPTIONAL,
                                         MeasConfigSN
    measConfigSN
                                                                                          OPTIONAL,
    selectedBandCombination
                                         BandCombinationInfoSN
                                                                                          OPTIONAL,
    fr-InfoListSCG
                                         FR-InfoList
                                                                                          OPTIONAL,
    candidateServingFreqListNR
                                         CandidateServingFreqListNR
                                                                                          OPTIONAL,
    nonCriticalExtension
                                         CG-Config-v1540-IEs
                                                                                          OPTIONAL
CG-Config-v1540-IEs ::=
                                     SEOUENCE {
    pSCellFrequency
                                         ARFCN-ValueNR
                                                                                          OPTIONAL,
    reportCGI-RequestNR
                                         SEOUENCE {
        requestedCellInfo
                                             SEOUENCE {
                                                 ARFCN-ValueNR,
            ssbFrequency
            cellForWhichToReportCGI
                                                 PhysCellId
                                                                                          OPTIONAL
                                                                                          OPTIONAL,
                                                                                          OPTIONAL,
    ph-InfoSCG
                                         PH-TypeListSCG
    nonCriticalExtension
                                         CG-Config-v1560-IEs
                                                                                          OPTIONAL
CG-Config-v1560-IEs ::=
                                     SEOUENCE {
    pSCellFrequencyEUTRA
                                        ARFCN-ValueEUTRA
                                                                                          OPTIONAL,
    scq-CellGroupConfigEUTRA
                                        OCTET STRING
                                                                                          OPTIONAL,
    candidateCellInfoListSN-EUTRA
                                        OCTET STRING
                                                                                          OPTIONAL,
    candidateServingFregListEUTRA
                                         CandidateServingFreqListEUTRA
                                                                                          OPTIONAL,
    needForGaps
                                        ENUMERATED {true}
                                                                                          OPTIONAL,
    drx-ConfigSCG
                                        DRX-Config
                                                                                          OPTIONAL,
    reportCGI-RequestEUTRA
                                        SEOUENCE
        requestedCellInfoEUTRA
                                        SEQUENCE
            eutraFrequency
                                                        ARFCN-ValueEUTRA,
            cellForWhichToReportCGI-EUTRA
                                                        EUTRA-PhysCellId
                                                                                          OPTIONAL
                                                                                          OPTIONAL,
    nonCriticalExtension
                                         CG-Config-v1590-IEs
                                                                                          OPTIONAL
CG-Config-v1590-IEs ::=
                                     SEOUENCE {
```

```
SEQUENCE (SIZE (1.. maxNrofServingCells-1)) OF ARFCN-ValueNR
    scellFrequenciesSN-NR
                                                                                                                 OPTIONAL,
    scellFrequenciesSN-EUTRA
                                        SEQUENCE (SIZE (1.. maxNrofServingCells-1)) OF ARFCN-ValueEUTRA
                                                                                                                 OPTIONAL,
    nonCriticalExtension
                                        CG-Config-v1610-IEs
                                                                                                                 OPTIONAL
CG-Config-v1610-IEs ::=
                                     SEOUENCE {
    drx-InfoSCG2
                                        DRX-Info2
                                                                                         OPTIONAL,
                                        CG-Config-v1620-IEs
    nonCriticalExtension
                                                                                         OPTIONAL
CG-Config-v1620-IEs ::=
                                    SEQUENCE {
    ueAssistanceInformationSCG-r16
                                        OCTET STRING (CONTAINING UEAssistanceInformation)
                                                                                            OPTIONAL,
    nonCriticalExtension
                                                                                             OPTIONAL
                                        CG-Config-v1630-IEs
CG-Config-v1630-IEs ::=
                                    SEOUENCE {
    selectedToffset-r16
                                        T-Offset-r16
                                                                                             OPTIONAL,
    nonCriticalExtension
                                        CG-Config-v1640-IEs
                                                                                             OPTIONAL
CG-Config-v1640-IEs ::=
                                     SEQUENCE {
    servCellInfoListSCG-NR-r16
                                        ServCellInfoListSCG-NR-r16
                                                                                         OPTIONAL,
    servCellInfoListSCG-EUTRA-r16
                                        ServCellInfoListSCG-EUTRA-r16
                                                                                         OPTIONAL,
    nonCriticalExtension
                                        CG-Config-v1700-IEs
                                                                                         OPTIONAL
CG-Config-v1700-IEs ::=
                                     SEOUENCE {
    candidateCellInfoListCPC-r17
                                        CandidateCellInfoListCPC-r17
                                                                                         OPTIONAL,
                                        ENUMERATED {enabled}
    twoPHRModeSCG-r17
                                                                                         OPTIONAL,
                                        CG-Config-v1730-IEs
    nonCriticalExtension
                                                                                         OPTIONAL
CG-Config-v1730-IEs ::=
                                     SEQUENCE {
    fr1-Carriers-SCG-r17
                                        INTEGER (1..32)
                                                                                         OPTIONAL,
    fr2-Carriers-SCG-r17
                                        INTEGER (1..32)
                                                                                         OPTIONAL,
    nonCriticalExtension
                                        SEQUENCE {}
                                                                                         OPTIONAL
ServCellInfoListSCG-NR-r16 ::=
                                    SEQUENCE (SIZE (1.. maxNrofServingCells)) OF ServCellInfoXCG-NR-r16
ServCellInfoXCG-NR-r16 ::=
                                     SEOUENCE {
    dl-FregInfo-NR-r16
                                        FrequencyConfig-NR-r16
                                                                                         OPTIONAL,
                                        FrequencyConfig-NR-r16
                                                                                         OPTIONAL, -- Cond FDD
    ul-FreqInfo-NR-r16
FrequencyConfig-NR-r16 ::=
                                     SEOUENCE
    freqBandIndicatorNR-r16
                                        FreqBandIndicatorNR,
    carrierCenterFreq-NR-r16
                                        ARFCN-ValueNR,
    carrierBandwidth-NR-r16
                                        INTEGER (1..maxNrofPhysicalResourceBlocks),
    subcarrierSpacing-NR-r16
                                        SubcarrierSpacing
                                    SEQUENCE (SIZE (1.. maxNrofServingCellsEUTRA)) OF ServCellInfoXCG-EUTRA-r16
ServCellInfoListSCG-EUTRA-r16 ::=
```

```
ServCellInfoXCG-EUTRA-r16 ::=
                                    SEOUENCE {
    dl-CarrierFreg-EUTRA-r16
                                        ARFCN-ValueEUTRA
                                                                                          OPTIONAL.
    ul-CarrierFreq-EUTRA-r16
                                        ARFCN-ValueEUTRA
                                                                                          OPTIONAL, -- Cond FDD
    transmissionBandwidth-EUTRA-r16
                                        TransmissionBandwidth-EUTRA-r16
                                                                                          OPTIONAL.
TransmissionBandwidth-EUTRA-r16 ::= ENUMERATED {rb6, rb15, rb25, rb50, rb75, rb100}
PH-TypeListSCG ::=
                                     SEQUENCE (SIZE (1..maxNrofServingCells)) OF PH-InfoSCG
PH-InfoSCG ::=
                                     SEQUENCE {
    servCellIndex
                                        ServCellIndex,
    ph-Uplink
                                        PH-UplinkCarrierSCG,
    ph-SupplementaryUplink
                                        PH-UplinkCarrierSCG
                                                                                          OPTIONAL,
    . . . ,
    [ [
    twoSRS-PUSCH-Repetition-r17
                                         ENUMERATED{enabled}
                                                                                          OPTIONAL
    11
PH-UplinkCarrierSCG ::=
                                     SEQUENCE {
                                        ENUMERATED {type1, type3},
    ph-Typelor3
MeasConfigSN ::=
                                     SEOUENCE {
    measuredFrequenciesSN
                                         SEQUENCE (SIZE (1..maxMeasFreqsSN)) OF NR-FreqInfo OPTIONAL,
NR-FregInfo ::=
                                     SEQUENCE {
    measuredFrequency
                                        ARFCN-ValueNR
                                                                                              OPTIONAL,
    . . .
ConfigRestrictModRegSCG ::=
                                     SEOUENCE {
    requestedBC-MRDC
                                         BandCombinationInfoSN
                                                                                              OPTIONAL,
    requestedP-MaxFR1
                                        P-Max
                                                                                              OPTIONAL,
    . . . ,
    requestedPDCCH-BlindDetectionSCG
                                        INTEGER (1..15)
                                                                                              OPTIONAL,
    requestedP-MaxEUTRA
                                         P-Max
                                                                                              OPTIONAL
    11,
    11
    requestedP-MaxFR2-r16
                                        P-Max
                                                                                              OPTIONAL,
    requestedMaxInterFreqMeasIdSCG-r16 INTEGER(1..maxMeasIdentitiesMN)
                                                                                              OPTIONAL,
    requestedMaxIntraFreqMeasIdSCG-r16 INTEGER(1..maxMeasIdentitiesMN)
                                                                                              OPTIONAL,
                                        T-Offset-r16
    requestedToffset-r16
                                                                                              OPTIONAL
    ]]
BandCombinationIndex ::= INTEGER (1..maxBandComb)
```

```
BandCombinationInfoSN ::=
                                    SEOUENCE {
    bandCombinationIndex
                                        BandCombinationIndex,
    requestedFeatureSets
                                        FeatureSetEntryIndex
FR-InfoList ::= SEQUENCE (SIZE (1..maxNrofServingCells-1)) OF FR-Info
FR-Info ::= SEQUENCE {
                        ServCellIndex,
    servCellIndex
    fr-Type
                        ENUMERATED {fr1, fr2}
CandidateServingFreqListNR ::= SEQUENCE (SIZE (1.. maxFreqIDC-MRDC)) OF ARFCN-ValueNR
CandidateServingFreqListEUTRA ::= SEQUENCE (SIZE (1.. maxFreqIDC-MRDC)) OF ARFCN-ValueEUTRA
T-Offset-r16 ::= ENUMERATED {ms0dot5, ms0dot75, ms1, ms1dot5, ms2, ms2dot5, ms3, spare1}
CandidateCellInfoListCPC-r17 ::= SEQUENCE (SIZE (1..maxFreq)) OF CandidateCellInfo-r17
CandidateCellInfo-r17 ::=
                                SEQUENCE {
    ssbFrequency-r17
                                     ARFCN-ValueNR,
    candidateList-r17
                                     SEQUENCE (SIZE (1..maxNrofCondCells-r16)) OF CandidateCell-r17
CandidateCell-r17 ::=
                                 SEOUENCE {
    physCellId-r17
                                     PhysCellId,
    condExecutionCondSCG-r17
                                     OCTET STRING (CONTAINING CondReconfigExecCondSCG-r17)
                                                                                                         OPTIONAL
-- TAG-CG-CONFIG-STOP
-- ASN1STOP
```

CG-Config field descriptions

candidateCellInfoListCPC

Contains information regarding candidate target cells for Conditional PSCell Change (CPC) that the source secondary gNB suggests the target secondary gNB to consider configuring for CPC.

candidateCellInfoListSN

Contains information regarding cells that the source secondary node suggests the target secondary gNB to consider configuring.

candidateCellInfoListSN-EUTRA

Includes the MeasResultList3EUTRA as specified in TS 36.331 [10]. Contains information regarding cells that the source secondary node suggests the target secondary eNB to consider configuring. This field is only used in NE-DC.

candidateServingFreqListNR, candidateServingFreqListEUTRA

Indicates frequencies of candidate serving cells for In-Device Co-existence Indication (see TS 36.331 [10]).

configRestrictModReq

Used by SN to request changes to SCG configuration restrictions previously set by MN to ensure UE capabilities are respected. E.g. can be used to request configuring an NR band combination whose use MN has previously forbidden. SN only includes this field in SN-initiated procedures.

drx-ConfigSCG

This field contains the complete DRX configuration of the SCG. This field is only used in NR-DC.

drx-InfoSCG

This field contains the DRX long and short cycle configuration of the SCG. This field is used in (NG)EN-DC and NE-DC.

drx-InfoSCG2

This field contains the drx-onDurationTimer configuration of the SCG. This field is only used in (NG)EN-DC.

fr-InfoListSCG

Contains information of FR information of serving cells that include PScell and SCells configured in SCG.

fr1-Carriers-SCG. fr2-Carriers-SCG

Indicates the number of FR1 or FR2 serving cells configured in SCG.

measuredFrequenciesSN

Used by SN to indicate a list of frequencies measured by the UE.

needForGaps

In NE-DC, indicates whether the SN requests gNB to configure measurements gaps.

ph-InfoSCG

Power headroom information in SCG that is needed in the reception of PHR MAC CE of MCG

ph-SupplementaryUplink

Power headroom information for supplementary uplink. In the case of (NG)EN-DC and NR-DC, this field is only present when two UL carriers are configured for a serving cell and one UL carrier reports type 1 PH while the other reports type 3 PH.

ph-Type1or3

Type of power headroom for a certain serving cell in SCG (PSCell and activated SCells). Value *type1* refers to type 1 power headroom, value *type3* refers to type 3 power headroom. (See TS 38.321 [3]).

ph-Uplink

Power headroom information for uplink.

pSCellFrequency, pSCellFrequencyEUTRA

Indicates the frequency of PSCell in NR (i.e., pSCellFrequency) or E-UTRA (i.e., pSCellFrequencyEUTRA). In this version of the specification, pSCellFrequency is not used in NE-DC whereas pSCellFrequencyEUTRA is only used in NE-DC. pSCellFrequency indicates the absoluteFrequencySSB.

reportCGI-RequestNR, reportCGI-RequestEUTRA

Used by SN to indicate to MN about configuring *reportCGI* procedure. The request may optionally contain information about the cell for which SN intends to configure *reportCGI* procedure. In this version of the specification, the *reportCGI-RequestNR* is used in (NG)EN-DC and NR-DC whereas *reportCGI-RequestEUTRA* is used only for NE-DC.

requestedBC-MRDC

Used to request configuring a band combination and corresponding feature sets which are forbidden to use by MN (i.e. outside of the allowedBC-ListMRDC) to allow renegotiation of the UE capabilities for SCG configuration.

requestedMaxInterFreqMeasIdSCG

Used to request the maximum number of allowed measurement identities to configure for inter-frequency measurement. This field is only used in NR-DC.

requestedMaxIntraFreqMeasIdSCG

Used to request the maximum number of allowed measurement identities to configure for intra-frequency measurement on each serving frequency.

requestedPDCCH-BlindDetectionSCG

Requested value of the reference number of cells for PDCCH blind detection allowed to be configured for the SCG.

requestedP-MaxEUTRA

Requested value for the maximum power for the serving cells the UE can use in E-UTRA SCG. This field is only used in NE-DC.

requestedP-MaxFR1

Requested value for the maximum power for the serving cells on frequency range 1 (FR1) in this secondary cell group (see TS 38.104 [12]) the UE can use in NR SCG.

requestedP-MaxFR2

Requested value for the maximum power for the serving cells on frequency range 2 (FR2) in this secondary cell group the UE can use in NR SCG. This field is only used in NR-DC.

requestedToffset

Requests the new value for the time offset restriction used by the SN for scheduling SCG transmissions (i.e. $T_{proc,SCG}^{max}$, see TS 38.213 [13]). This field is used in NR-DC only when the fields nrdc-PC-mode-FR1-r16 or nrdc-PC-mode-FR2-r16 are set to dynamic. Value ms0dot5 corresponds to 0.5 ms, value ms0dot75 corresponds to 0.75 ms, value ms1 corresponds to 1 ms and so on.

scellFrequenciesSN-EUTRA, scellFrequenciesSN-NR

Indicates the frequency of all SCells with SSB configured in SCG. The field scellFrequenciesSN-EUTRA is used in NE-DC; the field scellFrequenciesSN-NR is used in (NG)EN-DC. In (NG)EN-DC, the field is optionally provided to the MN. scellFrequenciesSN-NR indicates absoluteFrequencySSB.

scq-CellGroupConfig

Contains the RRCReconfiguration message (containing only secondaryCellGroup and/or measConfig and/or otherConfig and/or conditionalReconfiguration and/or bap-Config and/or iab-IP-AddressConfigurationList):

- to be sent to the UE, used upon SCG establishment or modification (only when the SCG is not released by the SN), as generated (entirely) by the (target) SgNB. In this case, the SN sets the *RRCReconfiguration* message in accordance with clause 6 e.g. regarding the "Need" or "Cond" statements.

or

- including the current SCG configuration of the UE, when provided in response to a query from MN, or in SN triggered SN change in order to enable delta signaling by the target SN. In this case, the SN sets the *RRCReconfiguration* message in accordance with clause 11.2.3.

The field is absent if neither SCG (re)configuration nor SCG configuration query nor SN triggered SN change is performed, e.g. at inter-node capability/configuration coordination which does not result in SCG (re)configuration towards the UE. The field is also absent upon an SCG release triggered by the SN. This field is not applicable in NE-DC.

scg-CellGroupConfigEUTRA

Includes the E-UTRA RRCConnectionReconfiguration message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field scg-Configuration:

- to be sent to the UE, used to (re-)configure the SCG configuration upon SCG establishment or modification (only when the SCG is not released by the SN), as generated (entirely) by the (target) SeNB. In this case, the SN sets the *scg-Configuration* within the EUTRA *RRCConnectionReconfiguration* message in accordance with clause 6 in TS 36.331 [10] e.g. regarding the "Need" or "Cond" statements.

or

- including the current SCG configuration of the UE, when provided in response to a query from MN, or in SN triggered SN change in order to enable delta signalling by the target SN.

The field is absent if neither SCG (re)configuration nor SCG configuration query nor SN triggered SN change is performed, e.g. at inter-node capability/configuration coordination which does not result in SCG (re)configuration towards the UE. The field is also absent upon an SCG release triggered by the SN. This field is only used in NEDC.

scg-RB-Config

Contains the IE RadioBearerConfig.

- to be sent to the UE, used to (re-)configure the SCG RB configuration upon SCG establishment or modification, as generated (entirely) by the (target) SgNB or SeNB. In this case, the SN sets the *RadioBearerConfig* in accordance with clause 6, e.g. regarding the "Need" or "Cond" statements.

or

- including the current SCG RB configuration of the UE, when provided in response to a query from MN or in SN triggered SN change or in SN triggered SN release or bearer type change between SN terminated bearer to MN terminated bearer in order to enable delta signaling by the MN or target SN. In this case, the SN sets the RadioBearerConfig in accordance with clause 11.2.3.

The field is absent if neither SCG (re)configuration nor SCG configuration query nor SN triggered SN change nor SN triggered SN release is performed, e.g. at inter-node capability/configuration coordination which does not result in SCG RB (re)configuration.

selectedBandCombination

Indicates the band combination selected by SN in (NG)EN-DC, NE-DC, and NR-DC. The SN should inform the MN with this field whenever the band combination and/or feature set it selected for the SCG changes (i.e. even if the new selection concerns a band combination and/or feature set that is allowed by the *allowedBC-ListMRDC*)

selectedToffset

Indicates the value used by the SN for scheduling SCG transmissions (i.e. $T_{proc,SCG}^{max}$, see TS 38.213 [13]). This field is used in NR-DC only when the fields nrdc-PC-mode-FR1-r16 or nrdc-PC-mode-FR2-r16 are set to dynamic. The SN can only indicate a value that is less than or equal to max-Toffset received from MN. This field is used in NR-DC only when MN has included the field max-Toffset in CG-ConfigInfo. Value ms0dot5 corresponds to 0.5 ms, value ms0dot75 corresponds to 0.75 ms, value ms1 corresponds to 1ms and so on.

servCellInfoListSCG-EUTRA

Indicates the carrier frequency and the transmission bandwidth of the serving cell(s) in the SCG in intra-band NE-DC. The field is needed when MN and SN operate serving cells in the same band for either contiguous or non-contiguous intra-band band combination or LTE NR inter-band band combinations where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [34]) in NE-DC.

servCellInfoListSCG-NR

Indicates the frequency band indicator, carrier center frequency, UE specific channel bandwidth and SCS of the serving cell(s) in the SCG in intra-band (NG)EN-DC. The field is needed when MN and SN operate serving cells in the same band for either contiguous or non-contiguous intra-band band combination or LTE NR inter-band band combinations where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [34]) in (NG)EN-DC.

twoPHRModeSCG

Indicates if the power headroom for SCG shall be reported as two PHRs (each PHR associated with a SRS resource set) is enabled or not.

twoSRS-PUSCH-Repetition

Indicates whether the indicated serving cell is configured for PUSCH repetition corresponding to two SRS resource sets configured in either srs-ResourceSetToAddModList or srs-ResourceSetToAddModListDCI-0-2 with usage 'codebook' or 'noncodebook'.

transmissionBandwidth-EUTRA

Indicates the transmission bandwidth on an E-UTRA carrier frequency as defined by the parameter Transmission Bandwidth Configuration "NRB" TS 36.104 [33]. The values rb6, rb15, rb25, rb50, rb75, rb100 indicate 6, 15, 25, 50, 75 and 100 resource blocks respectively.

ueAssistanceInformationSCG

Includes for each UE assistance feature associated with the SCG, the information last reported by the UE in the NR UEAssistanceInformation message for the SCG, if any.

BandCombinationInfoSN field descriptions

bandCombinationIndex

In case of NR-DC, this field indicates the position of a band combination in the *supportedBandCombinationList*. In case of NE-DC, this field indicates the position of a band combination in the *supportedBandCombinationList* and/or *supportedBandCombinationListNEDC-Only*. In case of (NG)EN-DC, this field indicates the position of a band combination in the *supportedBandCombinationList* and/or *supportedBandCombinationList-UplinkTxSwitch*. Band combination entries in *supportedBandCombinationList* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationListNEDC-Only* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationListNEDC-Only* increased by the number of entries in *supportedBandCombinationList.* Band combination in the *supportedBandCombinationList-UplinkTxSwitch* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationList-UplinkTxSwitch* increased by the number of entries in *supportedBandCombinationList*.

requestedFeatureSets

The position in the FeatureSetCombination which identifies one FeatureSetUplink/Downlink for each band entry in the associated band combination

Conditional Presence	Explanation
FDD	This field is mandatory present if dl-FreqInfo-NR is included and concerns an FDD carrier; otherwise the field is absent.

CG-ConfigInfo

This message is used by master eNB or gNB to request the SgNB or SeNB to perform certain actions e.g. to establish, modify or release an SCG. The message may include additional information e.g. to assist the SgNB or SeNB to set the SCG configuration. It can also be used by a CU to request a DU to perform certain actions, e.g. to establish, or modify an MCG or SCG.

Direction: Master eNB or gNB to secondary gNB or eNB, alternatively CU to DU.

CG-ConfigInfo message

```
-- ASN1START
-- TAG-CG-CONFIG-INFO-START

CG-ConfigInfo ::= SEQUENCE {
    criticalExtensions CHOICE {
        cl CHOICE {
            cg-ConfigInfo CG-ConfigInfo-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
```

```
criticalExtensionsFuture
                                         SEOUENCE {}
CG-ConfigInfo-IEs ::=
                                 SEQUENCE {
    ue-CapabilityInfo
                                    OCTET STRING (CONTAINING UE-CapabilityRAT-ContainerList)
                                                                                                        OPTIONAL, -- Cond SN-AddMod
    candidateCellInfoListMN
                                     MeasResultList2NR
                                                                                                        OPTIONAL,
    candidateCellInfoListSN
                                     OCTET STRING (CONTAINING MeasResultList2NR)
                                                                                                        OPTIONAL,
    measResultCellListSFTD-NR
                                     MeasResultCellListSFTD-NR
                                                                                                        OPTIONAL,
    scgFailureInfo
                                     SEQUENCE {
        failureType
                                         ENUMERATED { t310-Expiry, randomAccessProblem,
                                                      rlc-MaxNumRetx, synchReconfigFailure-SCG,
                                                      scg-reconfigFailure,
                                                      srb3-IntegrityFailure},
                                         OCTET STRING (CONTAINING MeasResultSCG-Failure)
        measResultSCG
                                                                                                        OPTIONAL,
    configRestrictInfo
                                     ConfigRestrictInfoSCG
                                                                                                        OPTIONAL,
    drx-InfoMCG
                                     DRX-Info
                                                                                                        OPTIONAL,
                                     MeasConfiqMN
    measConfiqMN
                                                                                                        OPTIONAL,
    sourceConfigSCG
                                    OCTET STRING (CONTAINING RRCReconfiguration)
                                                                                                        OPTIONAL,
    scg-RB-Config
                                    OCTET STRING (CONTAINING RadioBearerConfig)
                                                                                                        OPTIONAL,
    mcg-RB-Config
                                    OCTET STRING (CONTAINING RadioBearerConfig)
                                                                                                        OPTIONAL,
    mrdc-AssistanceInfo
                                    MRDC-AssistanceInfo
                                                                                                        OPTIONAL,
    nonCriticalExtension
                                     CG-ConfigInfo-v1540-IEs
                                                                                                        OPTIONAL
CG-ConfigInfo-v1540-IEs ::=
                                SEOUENCE {
    ph-InfoMCG
                                     PH-TypeListMCG
                                                                                                        OPTIONAL,
    measResultReportCGI
                                     SEOUENCE {
                                        ARFCN-ValueNR,
        ssbFrequency
        cellForWhichToReportCGI
                                         PhysCellId,
                                         CGI-InfoNR
        cgi-Info
                                                                                                        OPTIONAL,
    nonCriticalExtension
                                                                                                        OPTIONAL
                                     CG-ConfigInfo-v1560-IEs
CG-ConfigInfo-v1560-IEs ::= SEQUENCE {
    candidateCellInfoListMN-EUTRA
                                         OCTET STRING
                                                                                                        OPTIONAL,
    candidateCellInfoListSN-EUTRA
                                        OCTET STRING
                                                                                                        OPTIONAL,
    sourceConfigSCG-EUTRA
                                         OCTET STRING
                                                                                                        OPTIONAL,
    scqFailureInfoEUTRA
                                         SEOUENCE {
                                             ENUMERATED { t313-Expiry, randomAccessProblem,
        failureTypeEUTRA
                                                     rlc-MaxNumRetx, scg-ChangeFailure},
        measResultSCG-EUTRA
                                             OCTET STRING
                                                                                                        OPTIONAL,
    drx-ConfigMCG
                                         DRX-Config
                                                                                                        OPTIONAL,
    measResultReportCGI-EUTRA
                                             SEOUENCE {
        eutraFrequency
                                             ARFCN-ValueEUTRA,
        cellForWhichToReportCGI-EUTRA
                                                 EUTRA-PhysCellId,
        cqi-InfoEUTRA
                                                 CGI-InfoEUTRA
                                                                                                        OPTIONAL,
    measResultCellListSFTD-EUTRA
                                         MeasResultCellListSFTD-EUTRA
                                                                                                        OPTIONAL,
    fr-InfoListMCG
                                         FR-InfoList
                                                                                                        OPTIONAL,
    nonCriticalExtension
                                         CG-ConfigInfo-v1570-IEs
                                                                                                        OPTIONAL
```

```
CG-ConfigInfo-v1570-IEs ::= SEQUENCE
    sftdFrequencyList-NR
                                        SFTD-FrequencyList-NR
                                                                                                        OPTIONAL,
    sftdFrequencyList-EUTRA
                                        SFTD-FrequencyList-EUTRA
                                                                                                        OPTIONAL,
    nonCriticalExtension
                                        CG-ConfigInfo-v1590-IEs
                                                                                                        OPTIONAL
CG-ConfigInfo-v1590-IEs ::= SEQUENCE {
    servFrequenciesMN-NR
                                    SEQUENCE (SIZE (1.. maxNrofServingCells-1)) OF ARFCN-ValueNR
                                                                                                        OPTIONAL,
    nonCriticalExtension
                                    CG-ConfigInfo-v1610-IEs
                                                                                                        OPTIONAL
CG-ConfigInfo-v1610-IEs ::= SEQUENCE {
    drx-InfoMCG2
                                 DRX-Info2
                                                                                                        OPTIONAL,
    alignedDRX-Indication
                                 ENUMERATED {true}
                                                                                                        OPTIONAL,
    scqFailureInfo-r16
                                        SEOUENCE
                                            ENUMERATED { scg-lbtFailure-r16, beamFailureRecoveryFailure-r16,
        failureType-r16
                                                          t312-Expiry-r16, bh-RLF-r16,
                                                         beamFailure-r17, spare3, spare2, spare1},
        measResultSCG-r16
                                            OCTET STRING (CONTAINING MeasResultSCG-Failure)
                                                                                                        OPTIONAL,
                                            SEOUENCE {
   dummy1
                                                ENUMERATED { scg-lbtFailure-r16, beamFailureRecoveryFailure-r16,
        failureTypeEUTRA-r16
                                                          t312-Expiry-r16, spare5,
                                                                      spare4, spare3, spare2, spare1},
        measResultSCG-EUTRA-r16
                                                OCTET STRING
                                                                                                        OPTIONAL,
    sidelinkUEInformationNR-r16
                                     OCTET STRING (CONTAINING SidelinkUEInformationNR-r16)
                                                                                                        OPTIONAL,
    sidelinkUEInformationEUTRA-r16
                                     OCTET STRING
                                                                                                        OPTIONAL,
    nonCriticalExtension
                                     CG-ConfigInfo-v1620-IEs
                                                                                                        OPTIONAL
CG-ConfigInfo-v1620-IEs ::=
                                        SEQUENCE {
    ueAssistanceInformationSourceSCG-r16
                                            OCTET STRING (CONTAINING UEAssistanceInformation)
                                                                                                        OPTIONAL,
    nonCriticalExtension
                                            CG-ConfigInfo-v1640-IEs
                                                                                                        OPTIONAL
CG-ConfigInfo-v1640-IEs ::=
                                        SEOUENCE
    servCellInfoListMCG-NR-r16
                                            ServCellInfoListMCG-NR-r16
                                                                                          OPTIONAL,
    servCellInfoListMCG-EUTRA-r16
                                            ServCellInfoListMCG-EUTRA-r16
                                                                                          OPTIONAL,
    nonCriticalExtension
                                            CG-ConfigInfo-v1700-IEs
                                                                                          OPTIONAL
CG-ConfigInfo-v1700-IEs ::=
    candidateCellListCPC-r17
                                            CandidateCellListCPC-r17
                                                                                          OPTIONAL,
    twoPHRModeMCG-r17
                                            ENUMERATED {enabled}
                                                                                          OPTIONAL,
    lowMobilityEvaluationConnectedInPCell-r17 ENUMERATED {enabled}
                                                                                          OPTIONAL,
    nonCriticalExtension
                                            CG-ConfigInfo-v1730-IEs
                                                                                          OPTIONAL
CG-ConfigInfo-v1730-IEs ::=
                                        SEOUENCE {
    fr1-Carriers-MCG-r17
                                            INTEGER (1..32)
                                                                                          OPTIONAL,
    fr2-Carriers-MCG-r17
                                            INTEGER (1..32)
                                                                                          OPTIONAL,
```

```
nonCriticalExtension
                                            SEOUENCE {}
                                                                                           OPTIONAL
ServCellInfoListMCG-NR-r16 ::=
                                        SEQUENCE (SIZE (1.. maxNrofServingCells)) OF ServCellInfoXCG-NR-r16
ServCellInfoListMCG-EUTRA-r16 ::=
                                        SEQUENCE (SIZE (1.. maxNrofServingCellsEUTRA)) OF ServCellInfoXCG-EUTRA-r16
SFTD-FrequencyList-NR ::=
                                        SEOUENCE (SIZE (1..maxCellSFTD)) OF ARFCN-ValueNR
SFTD-FrequencyList-EUTRA ::=
                                        SEQUENCE (SIZE (1..maxCellSFTD)) OF ARFCN-ValueEUTRA
ConfigRestrictInfoSCG ::=
                                SEOUENCE {
    allowedBC-ListMRDC
                                    BandCombinationInfoList
                                                                                                        OPTIONAL,
    powerCoordination-FR1
                                        SEOUENCE {
        p-maxNR-FR1
                                        P-Max
                                                                                                        OPTIONAL,
        p-maxEUTRA
                                        P-Max
                                                                                                        OPTIONAL,
        p-maxUE-FR1
                                        P-Max
                                                                                                        OPTIONAL
                                                                                                        OPTIONAL,
    servCellIndexRangeSCG
                                     SEOUENCE {
        lowBound
                                        ServCellIndex,
        upBound
                                        ServCellIndex
                                                                                                        OPTIONAL,
                                                                                                                    -- Cond SN-AddMod
    maxMeasFreqsSCG
                                        INTEGER(1..maxMeasFreqsMN)
                                                                                                        OPTIONAL,
    dummy
                                        INTEGER(1..maxMeasIdentitiesMN)
                                                                                                        OPTIONAL,
    ГΓ
    selectedBandEntriesMNList
                                     SEQUENCE (SIZE (1..maxBandComb)) OF SelectedBandEntriesMN
                                                                                                        OPTIONAL,
    pdcch-BlindDetectionSCG
                                     INTEGER (1..15)
                                                                                                        OPTIONAL,
    maxNumberROHC-ContextSessionsSN
                                     INTEGER(0.. 16384)
                                                                                                        OPTIONAL
    maxIntraFreqMeasIdentitiesSCG
                                       INTEGER(1..maxMeasIdentitiesMN)
                                                                                                        OPTIONAL,
    maxInterFreqMeasIdentitiesSCG
                                       INTEGER(1..maxMeasIdentitiesMN)
                                                                                                        OPTIONAL
    ]],
    11
    p-maxNR-FR1-MCG-r16
                                       P-Max
                                                                                                        OPTIONAL.
    powerCoordination-FR2-r16
                                       SEOUENCE {
        p-maxNR-FR2-MCG-r16
                                            P-Max
                                                                                                        OPTIONAL,
                                            P-Max
        p-maxNR-FR2-SCG-r16
                                                                                                        OPTIONAL,
        p-maxUE-FR2-r16
                                            P-Max
                                                                                                        OPTIONAL
                                                                                                        OPTIONAL,
    nrdc-PC-mode-FR1-r16
                            ENUMERATED {semi-static-model, semi-static-mode2, dynamic}
                                                                                                        OPTIONAL,
    nrdc-PC-mode-FR2-r16
                            ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic}
                                                                                                        OPTIONAL,
    maxMeasSRS-ResourceSCG-r16
                                     INTEGER(0..maxNrofCLI-SRS-Resources-r16)
                                                                                                        OPTIONAL,
    maxMeasCLI-ResourceSCG-r16
                                     INTEGER(0..maxNrofCLI-RSSI-Resources-r16)
                                                                                                        OPTIONAL,
                                     INTEGER(0..65536)
    maxNumberEHC-ContextsSN-r16
                                                                                                        OPTIONAL,
    allowedReducedConfigForOverheating-r16
                                                 OverheatingAssistance
                                                                                                        OPTIONAL,
    maxToffset-r16
                                     T-Offset-r16
                                                                                                        OPTIONAL
    11,
    [ [
    allowedReducedConfigForOverheating-r17
                                                OverheatingAssistance-r17
                                                                                                        OPTIONAL,
    maxNumberUDC-DRB-r17
                                     INTEGER (0..2)
                                                                                                        OPTIONAL,
    maxNumberCPCCandidates-r17
                                     INTEGER(0..maxNrofCondCells-1-r17)
                                                                                                        OPTIONAL
    ]]
```

```
SelectedBandEntriesMN ::=
                                SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandEntryIndex
BandEntryIndex ::=
                                INTEGER (0.. maxNrofServingCells)
PH-TypeListMCG ::=
                                SEQUENCE (SIZE (1..maxNrofServingCells)) OF PH-InfoMCG
PH-InfoMCG ::=
                                 SEQUENCE {
                                         ServCellIndex,
    servCellIndex
    ph-Uplink
                                         PH-UplinkCarrierMCG,
    ph-SupplementaryUplink
                                         PH-UplinkCarrierMCG
                                                                                                         OPTIONAL,
    . . . ,
    ] ]
    twoSRS-PUSCH-Repetition-r17
                                         ENUMERATED{enabled}
                                                                                                         OPTIONAL
    ]]
PH-UplinkCarrierMCG ::=
                                 SEOUENCE {
    ph-Typelor3
                                         ENUMERATED {type1, type3},
BandCombinationInfoList ::=
                                 SEQUENCE (SIZE (1..maxBandComb)) OF BandCombinationInfo
BandCombinationInfo ::=
                                 SEQUENCE {
    bandCombinationIndex
                                     BandCombinationIndex,
    allowedFeatureSetsList
                                     SEQUENCE (SIZE (1..maxFeatureSetsPerBand)) OF FeatureSetEntryIndex
FeatureSetEntryIndex ::=
                                INTEGER (1.. maxFeatureSetsPerBand)
DRX-Info ::=
                                 SEQUENCE {
                                    CHOICE {
    drx-LongCycleStartOffset
        ms10
                                         INTEGER(0..9),
        ms20
                                         INTEGER(0..19),
        ms32
                                         INTEGER(0..31),
        ms40
                                         INTEGER(0..39),
        ms60
                                         INTEGER(0..59),
        ms64
                                         INTEGER(0..63),
        ms70
                                         INTEGER(0..69),
        ms80
                                         INTEGER(0..79),
        ms128
                                         INTEGER(0..127),
        ms160
                                         INTEGER(0..159),
        ms256
                                         INTEGER (0..255),
        ms320
                                         INTEGER(0..319),
        ms512
                                         INTEGER(0..511),
        ms640
                                         INTEGER(0..639),
        ms1024
                                         INTEGER(0..1023),
        ms1280
                                         INTEGER (0..1279),
        ms2048
                                         INTEGER(0..2047),
        ms2560
                                         INTEGER(0..2559),
        ms5120
                                         INTEGER(0..5119),
        ms10240
                                         INTEGER(0..10239)
```

```
short.DRX
                                        SEOUENCE {
        drx-ShortCycle
                                            ENUMERATED
                                                ms2, ms3, ms4, ms5, ms6, ms7, ms8, ms10, ms14, ms16, ms20, ms30, ms32,
                                                ms35, ms40, ms64, ms80, ms128, ms160, ms256, ms320, ms512, ms640, spare9,
                                                spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1 },
        drx-ShortCycleTimer
                                            INTEGER (1..16)
                                                                                                   OPTIONAL
DRX-Info2 ::=
                       SEQUENCE {
    drx-onDurationTimer
                               subMilliSeconds INTEGER (1..31),
                               milliSeconds
                                             ENUMERATED {
                                   ms1, ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30, ms40, ms50, ms60,
                                   ms80, ms100, ms200, ms300, ms400, ms500, ms600, ms800, ms1000, ms1200,
                                   ms1600, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1
MeasConfigMN ::= SEQUENCE {
   measuredFrequenciesMN
                                        SEQUENCE (SIZE (1..maxMeasFreqsMN)) OF NR-FreqInfo
                                                                                                   OPTIONAL,
   measGapConfig
                                        SetupRelease { GapConfig }
                                                                                                   OPTIONAL,
                                        ENUMERATED {perUE, perFR1}
    gapPurpose
                                                                                                   OPTIONAL,
    ] ]
    measGapConfigFR2
                                        SetupRelease { GapConfig }
                                                                                                   OPTIONAL
    ]],
    [ [
    interFreqNoGap-r16
                                        ENUMERATED {true}
                                                                                                   OPTIONAL
    11
MRDC-AssistanceInfo ::= SEQUENCE {
    affectedCarrierFreqCombInfoListMRDC
                                            SEQUENCE (SIZE (1..maxNrofCombIDC)) OF AffectedCarrierFreqCombInfoMRDC,
    ] ]
    overheatingAssistanceSCG-r16
                                            OCTET STRING (CONTAINING OverheatingAssistance)
                                                                                                   OPTIONAL
    ]],
    [ [
    overheatingAssistanceSCG-FR2-2-r17
                                            OCTET STRING (CONTAINING OverheatingAssistance-r17)
                                                                                                   OPTIONAL
AffectedCarrierFreqCombInfoMRDC ::= SEQUENCE {
    victimSystemType
                                        VictimSystemType,
    interferenceDirectionMRDC
                                        ENUMERATED {eutra-nr, nr, other, utra-nr-other, nr-other, spare3, spare2, spare1},
    affectedCarrierFreqCombMRDC
                                        SEQUENCE
        affectedCarrierFreqCombEUTRA
                                            AffectedCarrierFreqCombEUTRA
                                                                                                   OPTIONAL,
        affectedCarrierFregCombNR
                                            AffectedCarrierFreqCombNR
                                                                                                   OPTIONAL
VictimSystemType ::= SEQUENCE {
```

```
ENUMERATED {true}
                                                               OPTIONAL,
    glonass
                               ENUMERATED {true}
                                                               OPTIONAL,
   bds
                               ENUMERATED {true}
                                                               OPTIONAL,
    galileo
                           ENUMERATED {true}
                                                               OPTIONAL,
    wlan
                               ENUMERATED {true}
                                                               OPTIONAL,
    bluetooth
                               ENUMERATED {true}
                                                               OPTIONAL
AffectedCarrierFreqCombEUTRA ::= SEQUENCE (SIZE (1..maxNrofServingCellsEUTRA)) OF ARFCN-ValueEUTRA
AffectedCarrierFreqCombNR ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF ARFCN-ValueNR
CandidateCellListCPC-r17 ::= SEQUENCE (SIZE (1..maxFreq)) OF CandidateCellCPC-r17
CandidateCellCPC-r17 ::=
                                  SEQUENCE {
    ssbFrequency-r17
                                      ARFCN-ValueNR,
                                      SEQUENCE (SIZE (1..maxNrofCondCells-r16)) OF PhysCellId
    candidateCellList-r17
-- TAG-CG-CONFIG-INFO-STOP
-- ASN1STOP
```

CG-ConfigInfo field descriptions

alignedDRX-Indication

This field is signalled upon MN triggered CGI reporting by the UE that requires aligned DRX configurations between the MCG and the SCG (i.e. same DRX cycle and onduration configured by MN completely contains on-duration configured by SN).

allowedBC-ListMRDC

A list of indices referring to band combinations in MR-DC capabilities from which SN is allowed to select the SCG band combination. Each entry refers to:

- a band combination numbered according to supportedBandCombinationList and supportedBandCombinationList-UplinkTxSwitch in the UE-MRDC-Capability (in case of (NG)EN-DC), or according to supportedBandCombinationList and supportedBandCombinationListNEDC-Only in the UE-MRDC-Capability (in case of NE-DC), or according to supportedBandCombinationList in the UE-NR-Capability (in case of NR-DC).
- and the Feature Sets allowed for each band entry. All MR-DC band combinations indicated by this field comprise the MCG band combination, which is a superset of the MCG band(s) selected by MN.

allowedReducedConfigForOverheating

Indicates the reduced configuration that the SCG is allowed to configure.

reducedMaxCCs in allowedReducedConfigForOverheating indicates the maximum number of downlink/uplink PSCell/SCells that the SCG is allowed to configure. This field is used in (NG)EN-DC and NR-DC.

reducedMaxBW-FR1 and reducedMaxBW-FR2 in allowedReducedConfigForOverheating indicates the maximum aggregated bandwidth across all downlink/uplink carriers of FR1 and FR2-1, respectively that the SCG is allowed to configure. reducedMaxBW-FR2-2 in allowedReducedConfigForOverheating-r17 indicates the maximum aggregated bandwidth across all downlink/uplink carriers of FR2-2 that the SCG is allowed to configure. This field is only used in NR-DC.

reducedMaxMIMO-LayersFR1 and reducedMaxMIMO-LayersFR2 in allowedReducedConfigForOverheating indicates the maximum number of downlink/uplink MIMO layers of each serving cell operating on FR1 and FR2-1, respectively that the SCG is allowed to configure. reducedMaxMIMO-LayersFR2-2 in allowedReducedConfigForOverheating-r17 indicates the maximum number of downlink/uplink MIMO layers of each serving cell operating on FR2-2 that the SCG is allowed to configure. This field is only used in NR-DC.

candidateCellInfoListMN. candidateCellInfoListSN

Contains information regarding cells that the master node or the source node suggests the target gNB or DU to consider configuring. In case of MN initiated CPA or CPC, the field *candidateCellInfoListMN* contains information regarding cells that the MN suggests the candidate target secondary node to consider configuring for MN initiated CPA or CPC.

For (NG)EN-DC, including CSI-RS measurement results in *candidateCellInfoListMN* is not supported in this version of the specification. For NR-DC, including SSB and/or CSI-RS measurement results in *candidateCellInfoListMN* is supported.

candidateCellInfoListMN-EUTRA, candidateCellInfoListSN-EUTRA

Includes the MeasResultList3EUTRA as specified in TS 36.331 [10]. Contains information regarding cells that the master node or the source node suggests the target secondary eNB to consider configuring. These fields are only used in NE-DC.

candidateCellListCPC

Contains information regarding cells that the source secondary node suggests the candidate target secondary node to consider configuring for SN initiated Conditional PSCell Change (CPC).

configRestrictInfo

Includes fields for which SqNB is explicitly indicated to observe a configuration restriction.

drx-ConfigMCG

This field contains the complete DRX configuration of the MCG. This field is only used in NR-DC.

drx-InfoMCG

This field contains the DRX long and short cycle configuration of the MCG. This field is used in (NG)EN-DC and NE-DC.

drx-InfoMCG2

This field contains the drx-onDurationTimer configuration of the MCG. This field is only used in (NG)EN-DC.

dummv. dummv1

These fields are not used in the specification and SN ignores the received value(s).

fr-InfoListMCG

Contains information of FR information of serving cells that include PCell and SCell(s) configured in MCG.

fr1-Carriers-MCG, fr2-Carriers-MCG

Indicates the number of FR1 or FR2 serving cells configured in MCG.

interFreqNoGap

Indicates that the field interFrequencyConfig-NoGap-r16 has been included within the MeasConfig IE generated by the MN.

IowMobilityEvaluationConnectedInPCell

Indicates if low mobility criterion has been configured in NR PCell.

maxInterFreqMeasIdentitiesSCG

Indicates the maximum number of allowed measurement identities that the SCG is allowed to configure for inter-frequency measurement. The maximum value for this field is 10. If the field is absent, the SCG is allowed to configure inter-frequency measurements up to the maximum value. This field is only used in NR-DC.

maxIntraFreqMeasIdentitiesSCG

Indicates the maximum number of allowed measurement identities that the SCG is allowed to configure for intra-frequency measurement on each serving frequency. The maximum value for this field is 9 (in case of (NG)EN-DC or NR-DC) or 10 (in case of NE-DC). If the field is absent, the SCG is allowed to configure intra-frequency measurements up to the maximum value on each serving frequency.

maxMeasCLI-ResourceSCG

Indicates the maximum number of CLI RSSI resources that the SCG is allowed to configure.

maxMeasFreqsSCG

Indicates the maximum number of NR inter-frequency carriers the SN is allowed to configure with PSCell for measurements.

maxMeasSRS-ResourceSCG

Indicates the maximum number of SRS resources that the SCG is allowed to configure for CLI measurement.

maxNumberCPCCandidates

Indicates the maximum numbers of conditional reconfigurations the SN is allowed to configure for SN initiated CPC. Value 0 indicates that the SN is not allowed to configure SN initiated CPC. If the field is absent, the SN is allowed to configure up to maxNrofCondCells-r16 conditional reconfigurations for SN-initiated CPC.

maxNumberROHC-ContextSessionsSN

Indicates the maximum number of ROHC context sessions allowed to SN terminated bearer, excluding context sessions that leave all headers uncompressed.

maxNumberEHC-ContextsSN

Indicates the maximum number of EHC contexts allowed to the SN terminated bearer. The field indicates the number of contexts in addition to CID = "all zeros", as specified in TS 38.323 [5].

maxNumberUDC-DRB

Indicates the maximum number of UDC DRBs allowed to SN terminated bearer. This field is used in NGEN-DC, NR-DC and NE-DC.

maxToffset

Indicates the maximum Toffset value the SN is allowed to use for scheduling SCG transmissions (see TS 38.213 [13]). This field is used in NR-DC only when the fields *nrdc-PC-mode-FR1-r16* or *nrdc-PC-mode-FR2-r16* are set to dynamic. Value *ms0dot5* corresponds to 0.5 ms, value *ms0dot75* corresponds to 0.75 ms, value *ms1* corresponds to 1 ms and so on.

measuredFrequenciesMN

Used by MN to indicate a list of frequencies measured by the UE.

measGapConfig

Indicates the FR1 and perUE measurement gap configuration configured by MN.

measGapConfigFR2

Indicates the FR2 measurement gap configuration configured by MN.

mcg-RB-Config

Contains all of the fields in the IE *RadioBearerConfig* used in MN, used by the SN to support delta configuration to UE (i.e. when MN does not use full configuration option), for bearer type change between MN terminated bearer with NR PDCP to SN terminated bearer. It is also used to indicate the PDCP duplication related information for MN terminated split bearer (whether duplication is configured and if so, whether it is initially activated) in SN Addition/Modification procedure. Otherwise, this field is absent.

measResultReportCGI, measResultReportCGI-EUTRA

Used by MN to provide SN with CGI-Info for the cell as per SN's request. In this version of the specification, the *measResultReportCGI* is used for (NG)EN-DC and NR-DC and the *measResultReportCGI-EUTRA* is used only for NE-DC.

measResultSCG-EUTRA

This field includes the MeasResultSCG-FailureMRDC IE as specified in TS 36.331 [10]. This field is only used in NE-DC.

measResultSFTD-EUTRA

SFTD measurement results between the PCell and the E-UTRA PScell in NE-DC. This field is only used in NE-DC.

mrdc-AssistanceInfo

Contains the IDC assistance information for MR-DC reported by the UE (see TS 36.331 [10]).

nrdc-PC-mode-FR1

Indicates the uplink power sharing mode that the UE uses in NR-DC FR1 (see TS 38.213 [13], clause 7.6).

nrdc-PC-mode-FR2

Indicates the uplink power sharing mode that the UE uses in NR-DC FR2 (see TS 38.213 [13], clause 7.6).

overheatingAssistanceSCG

Contains the UE's preference on reduced configuration for NR SCG to address overheating. This field is only used in (NG)EN-DC.

overheatingAssistanceSCG-FR2-2

Contains the UE's preference on reduced configuration for NR SCG on FR2-2 to address overheating. This field is only used in (NG)EN-DC.

p-maxEUTRA

Indicates the maximum total transmit power to be used by the UE in the E-UTRA cell group (see TS 36.104 [33]). This field is used in (NG)EN-DC and NE-DC.

p-maxNR-FR1

For (NG)EN-DC and NE-DC, the field indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 1 (FR1) (see TS 38.104 [12]). For NR-DC, it indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 1 (FR1) (see TS 38.104 [12]) the UE can use in NR SCG.

p-maxUE-FR1

Indicates the maximum total transmit power to be used by the UE across all serving cells in frequency range 1 (FR1).

p-maxNR-FR1-MCG

Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 1 (FR1) (see TS 38.104 [12]) the UE can use in NR MCG. This field is only used in NR-DC.

p-maxNR-FR2-SCG

Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 2 (FR2) (see TS 38.104 [12]) the UE can use in NR SCG.

p-maxUE-FR2

Indicates the maximum total transmit power to be used by the UE across all serving cells in frequency range 2 (FR2).

p-maxNR-FR2-MCG

Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 2 (FR2) (see TS 38.104 [12]) the UE can use in NR MCG.

pdcch-BlindDetectionSCG

Indicates the maximum value of the reference number of cells for PDCCH blind detection allowed to be configured for the SCG.

ph-InfoMCG

Power headroom information in MCG that is needed in the reception of PHR MAC CE in SCG.

ph-SupplementaryUplink

Power headroom information for supplementary uplink. For UE in (NG)EN-DC, this field is absent.

ph-Type1or3

Type of power headroom for a serving cell in MCG (PCell and activated SCells). *type1* refers to type 1 power headroom, *type3* refers to type 3 power headroom. (See TS 38.321 [3]).

ph-Uplink

Power headroom information for uplink.

powerCoordination-FR1

Indicates the maximum power that the UE can use in FR1.

powerCoordination-FR2

Indicates the maximum power that the UE can use in frequency range 2 (FR2). This field is only used in NR-DC.

scgFailureInfo

Contains SCG failure type and measurement results. In case the sender has no measurement results available, the sender may include one empty entry (i.e. without any optional fields present) in *measResultPerMOList*. This field is used in (NG)EN-DC and NR-DC.

scg-RB-Config

Contains all of the fields in the IE RadioBearerConfig used in SN, used to allow the target SN to use delta configuration to the UE, e.g. during SN change. The field is signalled upon change of SN unless MN uses full configuration option. Otherwise, the field is absent.

selectedBandEntriesMNList

A list of indices referring to the position of a band entry selected by the MN, in each band combination entry in *allowedBC-ListMRDC* IE. *BandEntryIndex* 0 identifies the first band in the *bandList* of the *BandCombination*, *BandEntryIndex* 1 identifies the second band in the *bandList* of the *BandCombination*, and so on. This *selectedBandEntriesMNList* includes the same number of entries, and listed in the same order as in *allowedBC-ListMRDC*. The SN uses this information to determine which bands out of the NR band combinations in *allowedBC-ListMRDC* it can configure in SCG in NR-DC. The SN can use this information to determine for which band pair(s) it should check *SimultaneousRxTxPerBandPair*.

servCellIndexRangeSCG

Range of serving cell indices that SN is allowed to configure for SCG serving cells.

servCellInfoListMCG-EUTRA

Indicates the carrier frequency and the transmission bandwidth of the serving cell(s) in the MCG in intra-band (NG)EN-DC. The field is needed when MN and SN operate serving cells in the same band for either contiguous or non-contiguous intra-band band combination or LTE NR inter-band band combinations where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [34]) in (NG)EN-DC.

servCellInfoListMCG-NR

Indicates the frequency band indicator, carrier center frequency, UE specific channel bandwidth and SCS of the serving cell(s) in the MCG in intra-band NE-DC. The field is needed when MN and SN operate serving cells in the same band for either contiguous or non-contiguous intra-band band combination or LTE NR inter-band band combinations where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [34]) in NE-DC.

servFrequenciesMN-NR

Indicates the frequency of all serving cells that include PCell and SCell(s) with SSB configured in MCG. This field is only used in NR-DC. servFrequenciesMN-NR indicates absoluteFrequencySSB.

sftdFrequencyList-NR

Includes a list of SSB frequencies. Each entry identifies the SSB frequency of a PSCell, which corresponds to one MeasResultCellSFTD-NR entry in the MeasResultCellListSFTD-NR.

sftdFrequencyList-EUTRA

Includes a list of E-UTRA frequencies. Each entry identifies the carrier frequency of a PSCell, which corresponds to one *MeasResultSFTD-EUTRA* entry in the *MeasResultCellListSFTD-EUTRA*.

sidelinkUEInformationEUTRA

This field contains the E-UTRA SidelinkUEInformation message as specified in TS 36.331 [10].

sidelinkUEInformationNR

This field contains the NR SidelinkUEInformationNR message.

sourceConfigSCG

Includes all of the current SCG configurations used by the target SN to build delta configuration to be sent to UE, e.g. during SN change. The field contains the *RRCReconfiguration* message, i.e. including *secondaryCellGroup* and *measConfig*. The field is signalled upon change of SN, unless MN uses full configuration option. Otherwise, the field is absent.

sourceConfigSCG-EUTRA

Includes the E-UTRA RRCConnectionReconfiguration message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field *scq-Configuration*. In this version of the specification, this field is absent when master qNB uses full configuration option. This field is only used in NE-DC.

twoPHRModeMCG

Indicates if the power headroom for MCG shall be reported as two PHRs (each PHR associated with a SRS resource set) is enabled or not.

twoSRS-PUSCH-Repetition

Indicates whether the indicated serving cell is configured for PUSCH repetition corresponding to two SRS resource sets configured in either srs-ResourceSetToAddModList or srs-ResourceSetToAddModListDCI-0-2 with usage 'codebook' or 'noncodebook'.

ueAssistanceInformationSourceSCG

Includes for each UE assistance feature associated with the SCG, the information last reported by the UE in the NR UEAssistanceInformation message for the source SCG, if any.

ue-CapabilityInfo

Contains the IE *UE-CapabilityRAT-ContainerList* supported by the UE (see NOTE 3). A gNB that retrieves MRDC related capability containers ensures that the set of included MRDC containers is consistent w.r.t. the feature set related information.

BandCombinationInfo field descriptions

allowedFeatureSetsList

Defines a subset of the entries in a FeatureSetCombination. Each index identifies a position in the FeatureSetCombination, which corresponds to one FeatureSetUplink/Downlink for each band entry in the associated band combination.

bandCombinationIndex

In case of NR-DC, this field indicates the position of a band combination in the *supportedBandCombinationList*. In case of NE-DC, this field indicates the position of a band combination in the *supportedBandCombinationList* and/or *supportedBandCombinationListNEDC-Only*. In case of (NG)EN-DC, this field indicates the position of a band combination in the *supportedBandCombinationList* and/or *supportedBandCombinationList-UplinkTxSwitch*. Band combination entries in *supportedBandCombinationList* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationListNEDC-Only* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationListNEDC-Only* increased by the number of entries in *supportedBandCombinationList.* Band combination in the *supportedBandCombinationList-UplinkTxSwitch* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationList-UplinkTxSwitch* increased by the number of entries in *supportedBandCombinationList*.

Conditional Presence	Explanation	
SN-AddMod	The field is mandatory present upon SN addition and SN change. It is optionally present upon SN modification and inter-MN handover	
	without SN change. Otherwise, the field is absent.	

NOTE 3: The following table indicates per MN RAT and SN RAT whether RAT capabilities are included or not in ue-CapabilityInfo.

MN RAT	SN RAT	NR capabilities	E-UTRA capabilities	MR-DC capabilities
E-UTRA	NR	Need not be included if the UE	Not included	Need not be included if the UE
		Radio Capability ID as specified		Radio Capability ID as specified
		in 23.502 [43] is used. Included		in 23.502 [43] is used. Included
		otherwise		otherwise
NR	E-UTRA	Not included	Need not be included if the UE	Need not be included if the UE
			Radio Capability ID as specified	Radio Capability ID as specified
			in 23.502 [43] is used. Included	in 23.502 [43] is used. Included
			otherwise	otherwise
NR	NR	Need not be included if the UE	Not included	Not included
		Radio Capability ID as specified		
		in 23.502 [43] is used. Included		
		otherwise		

MeasurementTimingConfiguration

The MeasurementTimingConfiguration message is used to convey assistance information for measurement timing.

Direction: en-gNB to eNB, eNB to en-gNB, gNB to gNB, ng-eNB to gNB, gNB to ng-eNB, ng-eNB to ng-eNB, gNB DU to gNB CU, and gNB CU to gNB DU.

MeasurementTimingConfiguration message

```
-- ASN1START
-- TAG-MEASUREMENT-TIMING-CONFIGURATION-START
MeasurementTimingConfiguration ::=
                                        SEQUENCE {
    criticalExtensions
                                            CHOICE {
       c1
                                                CHOICE {
           measTimingConf
                                                    MeasurementTimingConfiguration-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
        criticalExtensionsFuture
                                       SEOUENCE {}
MeasurementTimingConfiguration-IEs ::= SEQUENCE
   measTiming
                                            MeasTimingList
                                                                                                OPTIONAL,
                                            MeasurementTimingConfiguration-v1550-IEs
   nonCriticalExtension
                                                                                                OPTIONAL
MeasurementTimingConfiguration-v1550-IEs ::= SEQUENCE {
    campOnFirstSSB
                                                 BOOLEAN,
    psCellOnlyOnFirstSSB
                                                 BOOLEAN,
    nonCriticalExtension
                                                 MeasurementTimingConfiguration-v1610-IEs
                                                                                                OPTIONAL
MeasurementTimingConfiguration-v1610-IEs ::= SEQUENCE {
    csi-RS-Config-r16
                                                  SEQUENCE {
       csi-RS-SubcarrierSpacing-r16
                                                      SubcarrierSpacing,
```

```
csi-RS-CellMobility-r16
                                                      CSI-RS-CellMobility,
       refSSBFreg-r16
                                                      ARFCN-ValueNR
    nonCriticalExtension
                                                  SEOUENCE {}
                                                                                                 OPTIONAL
MeasTimingList ::= SEOUENCE (SIZE (1..maxMeasFreqsMN)) OF MeasTiming
MeasTiming ::= SEQUENCE {
    frequencyAndTiming
                                            SEOUENCE {
       carrierFreq
                                                ARFCN-ValueNR,
        ssbSubcarrierSpacing
                                                SubcarrierSpacing,
       ssb-MeasurementTimingConfiguration
                                                SSB-MTC,
       ss-RSSI-Measurement
                                                SS-RSSI-Measurement
                                                                                                 OPTIONAL
                                                                                                 OPTIONAL,
    [ [
    ssb-ToMeasure
                                            SSB-ToMeasure
                                                                                                 OPTIONAL,
    physCellId
                                            PhysCellId
                                                                                                 OPTIONAL
    11
-- TAG-MEASUREMENT-TIMING-CONFIGURATION-STOP
-- ASN1STOP
```

MeasTiming field descriptions

carrierFreq, ssbSubcarrierSpacing

Indicates the frequency and subcarrier spacing of the SS block of the cell for which this message is included, or of other SS blocks within the same carrier.

ssb-MeasurementTimingConfiguration

Indicates the SMTC which can be used to search for SSB of the cell for which the message is included. When the message is included in "Served NR Cell Information" (see TS 36.423 [37]), "Served Cell Information NR" (see TS 38.423 [35]), or "Served Cell Information" (see TS 38.473 [36]), the timing is based on the cell for which the message is included. When the message is included in "NR Neighbour Information" (see TS 36.423 [37]), or "Served Cell Information" (see TS 38.423 [35]), the timing is based on the cell indicated in the "Served NR Cell Information" or "Served Cell Information NR" with which the "NR Neighbour Information" or "Neighbour Information NR" is provided. When the message is included in "CU to DU RRC Information", the timing is based on the cell indicated by SpCell ID with which the message is included.

ss-RSSI-Measurement

Provides the configuration which can be used for RSSI measurements of the cell for which the message is included.

MeasurementTimingConfiguration field descriptions

campOnFirstSSB

Value *true* indicates that the SSB indicated in the first instance of *MeasTiming* in the *measTiming* list can be used for camping and for a PCell configuration (i.e. in *spCellConfigCommon* of the *masterCellGroup*).

csi-RS-CellMobility

Indicates the CSI-RS configuration of the cell for which this message is included. The timing of the CSI-RS resources is based on the SSB indicated by refSSBFreq.

csi-RS-SubcarrierSpacing

Indicates the subcarrier spacing of the CSI-RS resources included in csi-rs-CellMobility.

measTiming

A list of SMTC information, SSB RSSI measurement information and associated NR frequency exchanged via EN-DC X2 Setup, EN-DC Configuration Update, Xn Setup and NG-RAN Node Configuration Update procedures, or F1 messages between gNB DU and gNB CU.

physCellId

Physical Cell Identity of the SSB on the ARFCN indicated by carrierFreq.

psCellOnlyOnFirstSSB

Value true indicates that only the SSB indicated in the first instance of MeasTiming in the measTiming list can be used for a PSCell configuration (i.e. in spCellConfigCommon of the secondaryCellGroup).

ssb-ToMeasure

The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]).

UERadioPagingInformation

This message is used to transfer radio paging information, covering both upload to and download from the 5GC, and between gNBs.

Direction: gNB to/from 5GC and gNB to/from gNB

UERadioPagingInformation message

```
-- ASN1START
-- TAG-UE-RADIO-PAGING-INFORMATION-START
UERadioPagingInformation ::= SEQUENCE {
    criticalExtensions
                                       CHOICE {
       c1
                                           CHOICE {
           ueRadioPagingInformation
                                               UERadioPagingInformation-IEs,
           spare7 NULL,
           spare6 NULL, spare5 NULL, spare4 NULL,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                           SEOUENCE {}
UERadioPagingInformation-IEs ::=
                                  SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR
    supportedBandListNRForPaging
                                                                                              OPTIONAL,
    nonCriticalExtension
                                       UERadioPagingInformation-v15e0-IEs
                                                                                               OPTIONAL
UERadioPagingInformation-v15e0-IEs ::= SEQUENCE {
```

```
dl-SchedulingOffset-PDSCH-TypeA-FDD-FR1
                                               ENUMERATED {supported}
                                                                               OPTIONAL,
    dl-SchedulingOffset-PDSCH-TypeA-TDD-FR1
                                               ENUMERATED {supported}
                                                                               OPTIONAL.
    dl-SchedulingOffset-PDSCH-TypeA-TDD-FR2
                                               ENUMERATED {supported}
                                                                               OPTIONAL.
    dl-SchedulingOffset-PDSCH-TypeB-FDD-FR1
                                               ENUMERATED {supported}
                                                                               OPTIONAL.
    dl-SchedulingOffset-PDSCH-TypeB-TDD-FR1
                                               ENUMERATED {supported}
                                                                               OPTIONAL.
    dl-SchedulingOffset-PDSCH-TypeB-TDD-FR2
                                               ENUMERATED {supported}
                                                                               OPTIONAL,
    nonCriticalExtension
                                       UERadioPagingInformation-v1700-IEs
                                                                                   OPTIONAL
UERadioPagingInformation-v1700-IES ::= SEOUENCE {
    ue-RadioPagingInfo-r17
                                          OCTET STRING (CONTAINING UE-RadioPagingInfo-r17)
                                                                                               OPTIONAL.
    inactiveStatePO-Determination-r17
                                          ENUMERATED {supported}
                                                                                               OPTIONAL,
    numberOfRxRedCap-r17
                                          ENUMERATED {one, two}
                                                                                               OPTIONAL,
   halfDuplexFDD-TypeA-RedCap-r17
                                          SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR OPTIONAL,
    nonCriticalExtension
                                          SEOUENCE {}
                                                                                              OPTIONAL
-- TAG-UE-RADIO-PAGING-INFORMATION-STOP
-- ASN1STOP
```

UERadioPagingInformation field descriptions

supportedBandListNRForPaging

Indicates the UE supported NR frequency bands which are derived by the qNB from UE-NR-Capability.

dl-SchedulingOffset-PDSCH-TypeA-FDD-FR1

Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type A in FDD FR1.

dl-SchedulingOffset-PDSCH-TypeA-TDD-FR1

Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type A in TDD FR1.

dl-SchedulingOffset-PDSCH-TypeA-TDD-FR2

Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type A in TDD FR2.

dl-SchedulingOffset-PDSCH-TypeB-FDD-FR1

Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type B in FDD FR1.

dl-SchedulingOffset-PDSCH-TypeB-TDD-FR1

Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type B in TDD FR1.

dl-SchedulingOffset-PDSCH-TypeB-TDD-FR2

Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type B in TDD FR2.

halfDuplexFDD-TvpeA-RedCap

Indicates whether the RedCap UE only supports half-duplex operation for FDD in the indicated band(s).

inactiveStatePO-Determination

Indicates whether the UE supports to use the same i s to determine PO in RRC INACTIVE state as in RRC IDLE state.

numberOfRxRedCap

Indicates the number of Rx branches supported by a RedCap UE.

ue-RadioPagingInfo

The field is used to transfer UE capability information used for paging. The gNB generates the ue-RadioPagingInfo and the contained UE capability information is absent when not supported by the UE.

UERadioAccessCapabilityInformation

This message is used to transfer UE radio access capability information, covering both upload to and download from the 5GC.

Direction: ng-eNB or gNB to/ from 5GC

UERadioAccessCapabilityInformation message

```
-- ASN1START
-- TAG-UE-RADIO-ACCESS-CAPABILITY-INFORMATION-START
UERadioAccessCapabilityInformation ::= SEQUENCE {
    criticalExtensions
       c1
                                          CHOICE {
           ueRadioAccessCapabilityInformation
                                               UERadioAccessCapabilityInformation-IEs,
           spare7 NULL,
           spare6 NULL, spare5 NULL, spare4 NULL,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                          SEOUENCE {}
UERadioAccessCapabilityInformation-IEs ::= SEQUENCE {
   ue-RadioAccessCapabilityInfo OCTET STRING (CONTAINING UE-CapabilityRAT-ContainerList),
   nonCriticalExtension
                                            SEQUENCE {}
                                                                                                         OPTIONAL
-- TAG-UE-RADIO-ACCESS-CAPABILITY-INFORMATION-STOP
-- ASN1STOP
```

UERadioAccessCapabilityInformation-IEs field descriptions

ue-RadioAccessCapabilityInfo

Including NR, MR-DC, E-UTRA radio access capabilities. A gNB that retrieves MRDC related capability containers ensures that the set of included MRDC containers is consistent w.r.t. the feature set related information.

11.2.3 Mandatory information in inter-node RRC messages

For the AS-Config transferred within the HandoverPreparationInformation:

- The source node shall include all fields necessary to reflect the current AS configuration of the UE, except for the fields *sourceSCG-NR-Config*, *sourceSCG-EUTRA-Config* and *sourceRB-SN-Config*, which can be omitted in case the source MN did not receive the latest configuration from the source SN. For *RRCReconfiguration* included in the field *rrcReconfiguration*, *ReconfigurationWithSync* is included with only the mandatory subfields (e.g. *newUE-Identity* and *t304*) and *ServingCellConfigCommon*;

- Need codes or conditions specified for subfields according to IEs defined in clause 6 do not apply. I.e. some fields shall be included regardless of the "Need" or "Cond" e.g. discardTimer;
- Based on the received AS configuration, the target node can indicate the delta (difference) to the current AS configuration (as included in *HandoverCommand*) to the UE. The fields *newUE-Identity* and *t304* included in *ReconfigurationWithSync* are not used for delta configuration purpose.

The *candidateCellInfoListSN*(-EUTRA) in CG-Config and the *candidateCellInfoListMN*(-EUTRA)/candidateCellInfoListSN(-EUTRA) in CG-ConfigInfo need not be included in procedures that do not involve a change of node.

For fields scg-CellGroupConfig, scg-CellGroupConfigEUTRA and scg-RB-Config in CG-Config (sent upon SN initiated SN change or other conditions as specified in field descriptions) and fields mcg-RB-Config and sourceConfigSCG in CG-ConfigInfo (sent upon change of SN):

- The source node shall include all fields necessary to reflect the current AS configuration of the UE, unless stated otherwise in the field description. For *RRCReconfiguration* included in the field *scg-CellGroupConfig* in *CG-Config*, *ReconfigurationWithSync* is included with only the mandatory subfields (e.g. *newUE-Identity* and *t304*) and *ServingCellConfigCommon*;
- Need codes or conditions specified for subfields according to IEs defined in clause 6 do not apply;
- Based on the received AS configuration, the target node can indicate the delta (difference) as compared to the current AS configuration to the UE. The fields *newUE-Identity* and *t304* in *ReconfigurationWithSync* are always included by the target node, i.e. they are not used for delta configuration purpose to UE.

For fields in *CG-Config* and *CG-ConfigInfo* listed below, absence of the field means that the receiver maintains the values informed via the previous message. Note that every time there is a change in the configuration covered by a listed field, the MN or SN shall include the field and it shall provide the full configuration provided by that field unless stated otherwise, if there is no change, the field can be omitted:

- configRestrictInfo;
- gapPurpose;
- measGapConfig (for which delta signaling applies);
- *measGapConfigFR2* (for which delta signaling applies);
- measResultCellListSFTD;
- measResultSFTD-EUTRA;
- sftdFrequencyList-EUTRA;
- sftdFrequencyList-NR;
- ue-CapabilityInfo;
- servFrequenciesMN-NR.

For other fields in CG-Config and CG-ConfigInfo, the sender shall always signal the appropriate value even if same as indicated in the previous inter-node message, unless explicitly stated otherwise.

11.3 Inter-node RRC information element definitions

-

11.4 Inter-node RRC multiplicity and type constraint values

Multiplicity and type constraints definitions

End of NR-InterNodeDefinitions

```
-- ASN1START
```

-- TAG-NR-INTER-NODE-DEFINITIONS-END-START

END

```
-- TAG-NR-INTER-NODE-DEFINITIONS-END-STOP
```

-- ASN1STOP

12 Processing delay requirements for RRC procedures

The UE performance requirements for RRC procedures are specified in the following tables. The performance requirement is expressed as the time in [ms] from the end of reception of the network -> UE message on the UE physical layer up to when the UE shall be ready for the reception of uplink grant for the UE -> network response message with no access delay other than the TTI-alignment (e.g. excluding delays caused by scheduling, the random access procedure or physical layer synchronisation). In case the RRC procedure triggers BWP switching, the RRC procedure delay is the value defined in the following table plus the BWP switching delay defined in TS 38.133 [14], clause 8.6.3.

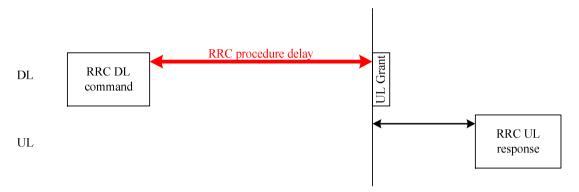


Figure 12.1-1: Illustration of RRC procedure delay

Table 12.1-1: UE performance requirements for RRC procedures for UEs

Procedure title:	Network -> UE	UE -> Network	Value [ms]	Notes
RRC Connection Control Procedures	<u> </u>			•
RRC reconfiguration	RRCReconfiguration	RRCReconfigurationComplete	10	
RRC reconfiguration (scell addition/release)	RRCReconfiguration	RRCReconfigurationComplete	16	
RRC reconfiguration (LTE/NR SCG establishment/ modification/ release)	RRCReconfiguration	RRCReconfigurationComplete	16	
RRC reconfiguration (Intra-NR mobility with LTE/NR SCG establishment/ modification/ release)	RRCReconfiguration	RRCReconfigurationComplete	16	
RRC reconfiguration	DLDedicatedMessage Segment	RRCReconfigurationComplete	16+(Nseg -1)*10	Nseg is number of RRC segments
RRC setup	RRCSetup	RRCSetupComplete	10	
RRC Release	RRCRelease		NA	
RRC re-establishment	RRCReestablishment	RRCReestablishmentComplete	10	

Procedure title:	Network -> UE	UE -> Network	Value [ms]	Notes
RRC resume	RRCResume	RRCResumeComplete	6 or 10	Value=6 applies for a UE supporting reduced CP latency for the case of RRCResume message only including MAC and PHY configuration, reestablishPDCP and reestablishPDCP and reestablishRLC for SRB2, multicast MRB(s) and DRB(s), and no DRX, SPS, configured grant, CA or MIMO re- configuration will be triggered by this message. Further, the UL grant for transmission of RRCResumeComplet e and the data is transmitted over common search space with DCI format 0_0. In this scenario, the RRC procedure delay [ms] can extend beyond the reception of the UL grant, up to 7 ms. For other cases, Value = 10 applies.
RRC resume (MCG SCell addition/restoration/release)	RRCResume	RRCResumeComplete	16	
RRC resume (SCG establishment/ restoration/release)	RRCResume	RRCResumeComplete	16	
RRC resume Initial AS security activation	DLDedicatedMessage Segment	RRCResumeComplete	16+(Nseg -1)*10	Nseg is number of RRC segments
	SecurityModeComman	SecurityModeComplete/Security	5	

Procedure title:	Network -> UE	UE -> Network	Value [ms]	Notes
Handover to NR	RRCReconfiguration (sent by other RAT)	RRCReconfigurationComplete	NA	The performance of this procedure is specified in TS 36.133 [40] clauses 5.3.4.2, 5.3.4A.2 and 5.3.5.2 in case of handover from E-UTRA to NR.
Handover from NR	MobilityFromNRComm and		NA	The performance of this procedure is specified in TS 38.133 [14], clauses 6.1.2.1.2 and 6.1.2.2.2.
Other procedures				
UE assistance information		UEAssistanceInformation	NA	
UE capability transfer	UECapabilityEnquiry	UECapabilityInformation	80	
Counter check	CounterCheck	CounterCheckResponse	5	
UE information	UEInformationRequest	UEInformationResponse	15	
DL Information transfer MR-DC	DLInformationTransfer MRDC		NA	The UE shall apply the performance requirements of the RRC message included within the DLInformationTransfer MRDC message.
IAB other information		IABOtherInformation	NA	
Sidelink UE information		SidelinkUEInformationNR	NA	
UE Positioning assistance information		UEPositioningAssistanceInfo	NA	

Annex A (informative): Guidelines, mainly on use of ASN.1

A.1 Introduction

The following clauses contain guidelines for the specification of RRC protocol data units (PDUs) with ASN.1.

A.2 Procedural specification

A.2.1 General principles

The procedural specification provides an overall high level description regarding the UE behaviour in a particular scenario.

It should be noted that most of the UE behaviour associated with the reception of a particular field is covered by the applicable parts of the PDU specification. The procedural specification may also include specific details of the UE behaviour upon reception of a field, but typically this should be done only for cases that are not easy to capture in the PDU clause e.g. general actions, more complicated actions depending on the value of multiple fields.

Likewise, the procedural specification need not specify the UE requirements regarding the setting of fields within the messages that are sent to the network i.e. this may also be covered by the PDU specification.

A.2.2 More detailed aspects

The following more detailed conventions should be used:

- Bullets:
 - Capitals should be used in the same manner as in other parts of the procedural text i.e. in most cases no capital applies since the bullets are part of the sentence starting with 'The UE shall:'
 - All bullets, including the last one in a clause, should end with a semi-colon i.e. an ';.
- Conditions:
 - Whenever multiple conditions apply, a semi-colon should be used at the end of each conditions with the exception of the last one, i.e. as in 'if cond1, or cond2.

A.3 PDU specification

A.3.1 General principles

A.3.1.1 ASN.1 clauses

The RRC PDU contents are formally and completely described using abstract syntax notation (ASN.1), see X.680 [6], X.681 [7].

The complete ASN.1 code is divided into a number of ASN.1 clauses in the specifications. In order to facilitate the extraction of the complete ASN.1 code from the specification, each ASN.1 clause begins with the following:

- a first text paragraph consisting entirely of an ASN.1 start tag, which consists of a double hyphen followed by a single space and the text string "ASN1START" (in all upper case letters);
- a second text paragraph consisting entirely of a *block start tag* is included, which consists of a double hyphen followed by a single space and the text string "TAG-NAME-START" (in all upper case letters), where the "NAME" refers to the main name of the paragraph (in all upper-case letters).

Similarly, each ASN.1 clause ends with the following:

- a first text paragraph consisting entirely of a *blockstop tag*, which consists of a double hyphen followed by a single space and the text string "TAG-NAME-STOP" (in all upper-case letters), where the "NAME" refers to the main name of the paragraph (in all upper-case letters);
- a second text paragraph consisting entirely of an ASN.1 stop tag, which consists of a double hyphen followed by a singlespace and the text "ASN1STOP" (in all upper case letters).

This results in the following tags:

- -- ASN1START
- -- TAG-NAME-START
- -- TAG-NAME-STOP
- -- ASN1STOP

The text paragraphs containing either of the start and stop tags should not contain any ASN.1 code significant for the complete description of the RRC PDU contents. The complete ASN.1 code may be extracted by copying all the text paragraphs between an ASN.1 start tag and the following ASN.1 stop tag in the order they appear, throughout the specification.

NOTE: A typical procedure for extraction of the complete ASN.1 code consists of a first step where the entire RRC PDU contents description (ultimately the entire specification) is saved into a plain text (ASCII) file format, followed by a second step where the actual extraction takes place, based on the occurrence of the ASN.1 start and stop tags.

A.3.1.2 ASN.1 identifier naming conventions

The naming of identifiers (i.e., the ASN.1 field and type identifiers) should be based on the following guidelines:

- Message (PDU) identifiers should be ordinary mixed case without hyphenation. These identifiers, *e.g.*, the *RRCConnectionModificationCommand*, should be used for reference in the procedure text. Abbreviations should be avoided in these identifiers and abbreviated forms of these identifiers should not be used.
- Type identifiers other than PDU identifiers should be ordinary mixed case, with hyphenation used to set off acronyms only where an adjacent letter is a capital, e.g., EstablishmentCause, SelectedPLMN (not Selected-PLMN, since the "d" in "Selected" is lowercase), InitialUE-Identity and MeasSFN-SFN-TimeDifference.
- Field identifiers shall start with a lowercase letter and use mixed case thereafter, *e.g.*, *establishmentCause*. If a field identifier begins with an acronym (which would normally be in upper case), the entire acronym is lowercase (*plmn-Identity*, not *pLMN-Identity*). The acronym is set off with a hyphen (*ue-Identity*, not *ueIdentity*), in order to facilitate a consistent search pattern with corresponding type identifiers.
- Identifiers should convey the meaning of the identifier and should avoid adding unnecessary postfixes (e.g. abstractions like 'Info') for the name.
- Identifiers that are likely to be keywords of some language, especially widely used languages, such as C++ or Java, should be avoided to the extent possible.
- Identifiers, other than PDU identifiers, longer than 25 characters should be avoided where possible. It is recommended to use abbreviations, which should be done in a consistent manner i.e. use 'Meas' instead of 'Measurement' for all occurrences. Examples of typical abbreviations are given in table A.3.1.2.1-1 below.
- For future extension: When an extension is introduced a suffix is added to the identifier of the concerned ASN.1 field and/or type. A suffix of the form "-rX" is used, with X indicating the release, for ASN.1 fields or types introduced in a later release (i.e. a release later than the original/first release of the protocol) as well as for ASN.1 fields or types for which a revision is introduced in a later release replacing a previous version, e.g., Foo-r9 for the Rel-9 version of the ASN.1 type Foo. A suffix of the form "-rXb" is used for the first revision of a field that it appears in the same release (X) as the original version of the field, "-rXc" for a second intra-release revision and so on. A suffix of the form "-vXYZ" is used for ASN.1 fields or types that only are an extension of a corresponding earlier field or type (see clause A.4), e.g., AnElement-v10b0 for the extension of the ASN.1 type AnElement introduced in version 10.11.0 of the specification. A number 0...9, 10, 11, etc. is used to represent the first part of the version number, indicating the release of the protocol. Lower case letters a, b, c, etc. are used to represent the second (and third) part of the version number if they are greater than 9. In the procedural specification, in field descriptions as well as in headings suffices are not used, unless there is a clear need to distinguish the extension from the original field.
- More generally, in case there is a need to distinguish different variants of an ASN.1 field or IE, a suffix should be added at the end of the identifiers e.g. MeasObjectUTRA, ConfigCommon. When there is no particular need to distinguish the fields (e.g. because the field is included in different IEs), a common field identifier name may be used. This may be attractive e.g. in case the procedural specification is the same for the different variants.
- It should be avoided to use field identifiers with the same name within the elements of a CHOICE, including using a CHOICE inside a SEQUENCE (to avoid certain compiler errors).

Table A.3.1.2-1: Examples of typical abbreviations used in ASN.1 identifiers

Abbreviation	Abbreviated word
Config	Configuration
DL	Downlink
Ext	Extension
Freq	Frequency
ld	Identity
Ind	Indication
Meas	Measurement
MIB	MasterInformationBlock
Neigh	Neighbour(ing)
Param(s)	Parameter(s)
Phys	Physical
PCI	Physical Cell Id
Proc	Process
Reconfig	Reconfiguration
Reest	Re-establishment
Req	Request
Rx	Reception
Sched	Scheduling
SIB	SystemInformationBlock
Sync	Synchronisation
Thr	Threshold
Tx	Transmission
UL	Uplink

NOTE: The table A.3.1.2.1-1 is not exhaustive. Additional abbreviations may be used in ASN.1 identifiers when needed.

A.3.1.3 Text references using ASN.1 identifiers

A text reference into the RRC PDU contents description from other parts of the specification is made using the ASN.1 field identifier of the referenced type. The ASN.1 field and type identifiers used in text references should be in the *italic font style*. The "do not check spelling and grammar" attribute in Word should be set. Quotation marks (i.e., "") should not be used around the ASN.1 field or type identifier.

A reference to an RRC PDU should be made using the corresponding ASN.1 field identifier followed by the word "message", e.g., a reference to the RRCRelease message.

A reference to a specific part of an RRC PDU, or to a specific part of any other ASN.1 type, should be made using the corresponding ASN.1 field identifier followed by the word "field", e.g., a reference to the *prioritisedBitRate* field in the example below.

```
-- /example/ ASN1START

LogicalChannelConfig ::= SEQUENCE {
   ul-SpecificParameters SEQUENCE {
      priority Priority,
```

NOTE: All the ASN.1 start tags in the ASN.1 clauses, used as examples in this annex to the specification, are deliberately distorted, in order not to include them when the ASN.1 description of the RRC PDU contents is extracted from the specification.

A reference to a specific type of information element should be made using the corresponding ASN.1 type identifier preceded by the acronym "IE", e.g., a reference to the IE *LogicalChannelConfig* in the example above.

References to a specific type of information element should only be used when those are generic, i.e., without regard to the particular context wherein the specific type of information element is used. If the reference is related to a particular context, e.g., an RRC PDU type (message) wherein the information element is used, the corresponding field identifier in that context should be used in the text reference.

A reference to a specific value of an ASN.1 field should be made using the corresponding ASN.1 value without using quotation marks around the ASN.1 value, e.g., 'if the *status* field is set to value *true*'.

A.3.2 High-level message structure

Within each logical channel type, the associated RRC PDU (message) types are alternatives within a CHOICE, as shown in the example below.

```
-- /example/ ASN1START
DL-DCCH-Message ::= SEQUENCE {
   message
                          DL-DCCH-MessageType
DL-DCCH-MessageType ::= CHOICE {
       dlInformationTransfer
                                             DLInformationTransfer,
       handoverFromEUTRAPreparationRequest
                                             HandoverFromEUTRAPreparationRequest,
       mobilityFromEUTRACommand
                                             MobilityFromEUTRACommand,
       rrcConnectionReconfiguration
                                             RRCConnectionReconfiguration,
       rrcConnectionRelease
                                             RRCConnectionRelease,
       securityModeCommand
                                             SecurityModeCommand,
       ueCapabilityEnquiry
                                             UECapabilityEnquiry,
       spare1 NULL
   -- ASN1STOP
```

A nested two-level CHOICE structure is used, where the alternative PDU types are alternatives within the inner level c1 CHOICE.

Spare alternatives (i.e., *spare1* in this case) may be included within the *c1* CHOICE to facilitate future extension. The number of such spare alternatives should not extend the total number of alternatives beyond an integer-power-of-two number of alternatives (i.e., eight in this case).

Further extension of the number of alternative PDU types is facilitated using the messageClassExtension alternative in the outer level CHOICE.

A.3.3 Message definition

Each PDU (message) type is specified in an ASN.1 clause similar to the one shown in the example below.

```
-- /example/ ASN1START
RRCConnectionReconfiguration ::= SEOUENCE {
    rrc-TransactionIdentifier
                                        RRC-TransactionIdentifier,
    criticalExtensions
                                        CHOICE {
                                            CHOICE {
       c1
           rrcConnectionReconfiguration-r8
                                                RRCConnectionReconfiguration-r8-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                           SEOUENCE {}
RRCConnectionReconfiguration-r8-IEs ::= SEOUENCE {
    -- Enter the IEs here.
-- ASN1STOP
```

Hooks for critical and non-critical extension should normally be included in the PDU type specification. How these hooks are used is further described in clause A.4.

Critical extensions are characterised by a redefinition of the PDU contents and need to be governed by a mechanism for protocol version agreement between the encoder and the decoder of the PDU, such that the encoder is prevented from sending a critically extended version of the PDU type, which is not comprehended by the decoder.

Critical extension of a PDU type is facilitated by a two-level CHOICE structure, where the alternative PDU contents are alternatives within the inner level *c1* CHOICE. Spare alternatives (i.e., *spare3* down to *spare1* in this case) may be included within the *c1* CHOICE. The number of spare alternatives to be included in the original PDU specification should be decided case by case, based on the expected rate of critical extension in the future releases of the protocol.

Further critical extension, when the spare alternatives from the original specifications are used up, is facilitated using the criticalExtensionsFuture in the outer level CHOICE.

In PDU types where critical extension is not expected in the future releases of the protocol, the inner level c1 CHOICE and the spare alternatives may be excluded, as shown in the example below.

```
-- /example/ ASN1START
```

Non-critical extensions are characterised by the addition of new information to the original specification of the PDU type. If not comprehended, a non-critical extension may be skipped by the decoder, whilst the decoder is still able to complete the decoding of the comprehended parts of the PDU contents.

Non-critical extensions at locations other than the end of the message or other than at the end of a field contained in a BIT or OCTET STRING are facilitated by use of the ASN.1 extension marker "...". The original specification of a PDU type should normally include the extension marker at the end of the sequence of information elements contained.

Non-critical extensions at the end of the message or at the end of a field that is contained in a BIT or OCTET STRING may be facilitated by use of an empty sequence that is marked OPTIONAL e.g. as shown in the following example:

```
-- /example/ ASN1START

RRCMessage-r8-IEs ::= SEQUENCE {
    field1 InformationElement1,
    field2 InformationElement2,

    nonCriticalExtension SEQUENCE {}

-- ASN1STOP
```

The ASN.1 clause specifying the contents of a PDU type may be followed by a *field description* table where a further description of, e.g., the semantic properties of the fields may be included. The general format of this table is shown in the example below. The field description table is absent in case there are no fields for which further description needs to be provided e.g. because the PDU does not include any fields, or because an IE is defined for each field while there is nothing specific regarding the use of this IE that needs to be specified.

%PDU-Typeldentifier% field descriptions
%field identifier%
Field description.
%field identifier%
Field description.

The field description table has one column. The header row shall contain the ASN.1 type identifier of the PDU type.

The following rows are used to provide field descriptions. Each row shall include a first paragraph with a *field identifier* (in *bold and italic* font style) referring to the part of the PDU to which it applies. The following paragraphs at the same row may include (in regular font style), e.g., semantic description, references to other specifications and/or specification of value units, which are relevant for the particular part of the PDU.

The parts of the PDU contents that do not require a field description shall be omitted from the field description table.

A.3.4 Information elements

Each IE (information element) type is specified in an ASN.1 clause similar to the one shown in the example below.

```
-- /example/ ASN1START
PRACH-ConfigSIB ::=
                                      INTEGER (0..1023),
   rootSequenceIndex
   prach-ConfigInfo
                                       PRACH-ConfigInfo
PRACH-Config ::=
                                   SEOUENCE {
    rootSequenceIndex
                                       INTEGER (0..1023),
                                       PRACH-ConfigInfo
   prach-ConfigInfo
                                                                          OPTIONAL -- Need N
PRACH-ConfigInfo ::=
                                      ENUMERATED {ffs},
    prach-ConfigIndex
   highSpeedFlag
                                       ENUMERATED {ffs}.
    zeroCorrelationZoneConfig
                                      ENUMERATED {ffs}
-- ASN1STOP
```

IEs should be introduced whenever there are multiple fields for which the same set of values apply. IEs may also be defined for other reasons e.g. to break down a ASN.1 definition in to smaller pieces.

A group of closely related IE type definitions, like the IEs *PRACH-ConfigSIB* and *PRACH-Config* in this example, are preferably placed together in a common ASN.1 clause. The IE type identifiers should in this case have a common base, defined as the *generic type identifier*. It may be complemented by a suffix to distinguish the different variants. The "*PRACH-Config*" is the generic type identifier in this example, and the "*SIB*" suffix is added to distinguish the variant. The clause heading and generic references to a group of closely related IEs defined in this way should use the generic type identifier.

The same principle should apply if a new version, or an extension version, of an existing IE is created for *critical* or *non-critical* extension of the protocol (see clause A.4). The new version, or the extension version, of the IE is included in the same ASN.1 clause defining the original. A suffix is added to the type identifier, using the naming conventions defined in clause A.3.1.2, indicating the release or version of the where the new version, or extension version, was introduced.

Local IE type definitions, like the IE *PRACH-ConfigInfo* in the example above, may be included in the ASN.1 clause and be referenced in the other IE types defined in the same ASN.1 clause. The use of locally defined IE types should be encouraged, as a tool to break up large and complex IE type definitions. It can improve the readability of the code.

There may also be a benefit for the software implementation of the protocol end-points, as these IE types are typically provided by the ASN.1 compiler as independent data elements, to be used in the software implementation.

An IE type defined in a local context, like the IE *PRACH-ConfigInfo*, should not be referenced directly from other ASN.1 clauses in the RRC specification. An IE type which is referenced in more than one ASN.1 clause should be defined in a separate clause, with a separate heading and a separate ASN.1 clause (possibly as one in a set of closely related IE types, like the IEs *PRACH-ConfigSIB* and *PRACH-Config* in the example above). Such IE types are also referred to as 'global IEs'.

NOTE: Referring to an IE type, that is defined as a local IE type in the context of another ASN.1 clause, does not generate an ASN.1 compilation error. Nevertheless, using a locally defined IE type in that way makes the IE type definition difficult to find, as it would not be visible at an outline level of the specification. It should be avoided.

The ASN.1 clause specifying the contents of one or more IE types, like in the example above, may be followed by a *field description* table, where a further description of, e.g., the semantic properties of the fields of the information elements may be included. This table may be absent, similar as indicated in clause A.3.3 for the specification of the PDU type. The general format of the *field description* table is the same as shown in clause A.3.3 for the specification of the PDU type.

A.3.5 Fields with optional presence

A field with optional presence may be declared with the keyword DEFAULT. It identifies a default value to be assumed, if the sender does not include a value for that field in the encoding:

```
-- /example/ ASN1START

PreambleInfo ::= SEQUENCE {
   numberOfRA-Preambles INTEGER (1..64) DEFAULT 1,
   ...
}

-- ASN1STOP
```

Alternatively, a field with optional presence may be declared with the keyword OPTIONAL. It identifies a field for which a value can be omitted. The omission carries semantics, which is different from any normal value of the field:

```
-- /example/ ASN1START

PRACH-Config ::= SEQUENCE {
   rootSequenceIndex INTEGER (0..1023),
   prach-ConfigInfo PRACH-ConfigInfo OPTIONAL -- Need N
}

-- ASN1STOP
```

The semantics of an optionally present field, in the case it is omitted, should be indicated at the end of the paragraph including the keyword OPTIONAL, using a short comment text with a need code. The need code includes the keyword "Need", followed by one of the predefined semantics tags (S, M, N or R) defined in clause 6.1. If the semantics tag S is used, the semantics of the absent field are further specified either in the field description table following the ASN.1 clause, or in procedure text.

The addition of OPTIONAL keywords for capability groups is based on the following guideline. If there is more than one field in the lower level IE, then OPTIONAL keyword is added at the group level. If there is only one field in the lower level IE, OPTIONAL keyword is not added at the group level.

A.3.6 Fields with conditional presence

A field with conditional presence is declared with the keyword OPTIONAL. In addition, a short comment text shall be included at the end of the paragraph including the keyword OPTIONAL. The comment text includes the keyword "Cond", followed by a condition tag associated with the field ("UL" in this example):

```
-- /example/ ASN1START

LogicalChannelConfig ::= SEQUENCE {
   ul-SpecificParameters SEQUENCE {
      priority INTEGER (0),
      ...
   } OPTIONAL -- Cond UL

-- ASN1STOP
```

When conditionally present fields are included in an ASN.1 clause, the field description table after the ASN.1 clause shall be followed by a *conditional presence* table. The conditional presence table specifies the conditions for including the fields with conditional presence in the particular ASN.1 clause.

Conditional presence	Explanation	
UL	Specification of the conditions for including the field associated with the condition tag = "UL". Semantics in case of optional presence under certain	
	conditions may also be specified.	

The conditional presence table has two columns. The first column (heading: "Conditional presence") contains the condition tag (in *italic* font style), which links the fields with a condition tag in the ASN.1 clause to an entry in the table. The second column (heading: "Explanation") contains a text specification of the conditions and requirements for the presence of the field. The second column may also include semantics, in case of an optional presence of the field, under certain conditions i.e. using the same predefined tags as defined for optional fields in A.3.5.

Conditional presence should primarily be used when presence of a field depends on the presence and/or value of other fields within the same message. If the presence of a field depends on whether another feature/function has been configured, while this function can be configured independently e.g. by another message and/or at another point in time, the relation is best reflected by means of a statement in the field description table.

If the ASN.1 clause does not include any fields with conditional presence, the conditional presence table shall not be included.

Whenever a field is only applicable in specific cases e.g. TDD, use of conditional presence should be considered.

A.3.7 Guidelines on use of lists with elements of SEQUENCE type

Where an information element has the form of a list (the SEQUENCE OF construct in ASN.1) with the type of the list elements being a SEQUENCE data type, an information element shall be defined for the list elements even if it would not otherwise be needed.

For example, a list of PLMN identities with reservation flags is defined as in the following example:

rather than as in the following (bad) example, which may cause generated code to contain types with unpredictable names:

```
-- /bad example/ ASN1START

PLMN-IdentityList ::= SEQUENCE (SIZE (1..6)) OF SEQUENCE {
   plmn-Identity PLMN-Identity,
   cellReservedForOperatorUse ENUMERATED {reserved, notReserved}
}

-- ASN1STOP
```

A.3.8 Guidelines on use of parameterised SetupRelease type

The usage of the parameterised *SetupRelease* type is like a function call in programming languages where the element type parameter is passed as a parameter. The parameterised type only implies a textual change in abstract syntax where all references to the parameterised type are replaced by the compiler with the release/setup choice. Two examples of the usage are shown below:

```
-- /example/ ASN1START
RRCMessage-rX-IEs ::= SEQUENCE {
   field-rX SetupRelease { IE-rX }
                                                     OPTIONAL,
                                                                 -- Need M
RRCMessage-rX-IEs ::= SEQUENCE {
   field-rX SetupRelease { Element-rX }
                                                        OPTIONAL,
                                                                -- Need M
Element-rX ::= SEQUENCE {
   field1-rX
                         IE1-rX,
                                                        OPTIONAL -- Need N
   field2-rX
                       IE2-rX
                                                           OPTIONAL, -- Need M
-- /example/ ASN1STOP
```

The SetupRelease is always be used with only named IEs, i.e. the example below is not allowed:

If a field defined using the parameterized SetupRelease type requires procedural text, the field is referred to using the values defined for the type itself, namely, "setup" and "release". For example, procedural text for field-rX above could be as follows:

```
1> if field-rX is set to "setup":
2> do something;
1> else (field-rX is set to "release"):
2> release field-rX (if appropriate).
```

A.3.9 Guidelines on use of ToAddModList and ToReleaseList

In order to benefit from delta signalling when modifying lists with many and/or large elements, so-called add/mod- and release- lists should be used. Instead of a single list containing all elements of the list, the ASN.1 provides two lists. One list is used to convey the actual elements that are to be added to the list or modified in the list. The second list conveys only the identities (IDs) of the list elements that are to be released from the list. In other words, the ASN.1 defines only means to signal modifications to a list maintained in the receiver (typically the UE). An example is provided below:

```
AnExampleIE ::= SEQUENCE {
    elementsToAddModList SEQUENCE (SIZE (1..maxNrofElements)) OF Element
    elementsToReleaseList SEQUENCE (SIZE (1..maxNrofElements)) OF ElementId
    ...
}

Element ::= SEQUENCE {
    elementId ElementId,
    aField INTEG ER (0..16777215),
    anotherField OCTET STRING,
    ...
}
```

```
ElementId ::= INTEGER (0..maxNrofElements-1)

maxNrofElements INTEGER ::= 50
maxNrofElements-1 INTEGER ::= 49

-- /example/ ASN1STOP
```

As can be seen, the elements of the list must contain an identity (INTEGER) that identifies the elements unambiguously upon addition, modification and removal. It is recommended to define an IE for that identifier (here ElementId) so that it can be used both for a field inside the element as well as in the *elementsToReleaseList*.

Both lists should be made OPTIONAL and flagged as "Need N". The need code reflects that the UE does not maintain the received lists as such but rather updates its configuration using the information therein. In other words, it is not possible to provide via delta signalling an update to a previously signalled *elementsToAddModList* or elementsToReleaseList (which Need M would imply). The update is always in relation to the UE's internal configuration.

Note that the release of a field (a list element as well as any other field) releases all its sub-fields (sub-fields configured by elementsToAddModList and any other sub-field).

If no procedural text is provided for a set of ToAddModList and ToReleaseList, the following generic procedure applies:

The UE shall:

- 1> for each *ElementId* in the *elementsToReleaseList*,:
 - 2> if the current UE configuration includes an *Element* with the given *ElementId*:
 - 3> release the *Element* from the current UE configuration;
- 1> for each *Element* in the *elementsToAddModList*:
 - 2> if the current UE configuration includes an *Element* with the given *ElementId*:
 - 3> modify the configured *Element* in accordance with the received *Element*;
 - 2> else:
 - 3> add received *Element* to the UE configuration.

A.3.10 Guidelines on use of lists (without ToAddModList and ToReleaseList)

As per clause 6.1.3, when using lists without the ToAddModList and ToReleaseList structure, the contents of the lists are always replaced. To illustrate this, an example is provided below:

```
-- /example/ ASNISTART
-- TAG_EXAMPLE_LISTS_START

AnExampleIE ::= SEQUENCE {
```

```
SEQUENCE (SIZE (1..maxNrofElements)) OF Element
   elementList
                                                                                                      OPTIONAL, -- Need M
   elementListExt-v2030
                         SEQUENCE (SIZE (1..maxNrofElementsExt)) OF Element
                                                                                                      OPTIONAL, -- Need M
   11
Element ::= SEOUENCE {
   useFeatureX BOOLEAN, aField INTEGER
   aField INTEGER (0..127) anotherField INTEGER (0..127)
                                                                                                      OPTIONAL, -- Need M
                                                                                                      OPTIONAL, -- Need R
maxNrofElements-1 INTEGER ::= 7
maxNrofElementsExt
                     INTEGER ::= 8
maxNrofElementsExt-1 INTEGER ::= 7
-- TAG_EXAMPLE_LISTS_STOP
-- /example/ ASN1STOP
```

As can be seen, the *elementList* list itself uses Need M, but each list entry *Element* contains mandatory, Need M and Need R fields. If the list is first signalled to UE with 3 entries, and subsequently again with 2 entries, UE shall retain only the latter list, i.e. the list with 2 elements will completely replace the list with 3 elements. That also means that the field *aField* will be treated as if it was newly created, i.e. network must include it if it wishes UE to utilize the field even if it was previously signalled. This also implies that the Need M field (*aField*) will be treated in the same way as the Need R field (*anotherField*), i.e. delta signalling is not applied and the network has to signal the field to ensure UE does not release the value (which is why Need M should not normally be used in the entries of these lists).

A.4 Extension of the PDU specifications

A.4.1 General principles to ensure compatibility

It is essential that extension of the protocol does not affect interoperability i.e. it is essential that implementations based on different versions of the RRC protocol are able to interoperate. In particular, this requirement applies for the following kind of protocol extensions:

- Introduction of new PDU types (i.e. these should not cause unexpected behaviour or damage).
- Introduction of additional fields in an extensible PDUs (i.e. it should be possible to ignore uncomprehended extensions without affecting the handling of the other parts of the message).
- Introduction of additional values of an extensible field of PDUs. If used, the behaviour upon reception of an uncomprehended value should be defined.

It should be noted that the PDU extension mechanism may depend on the logical channel used to transfer the message e.g. for some PDUs an implementation may be aware of the protocol version of the peer in which case selective ignoring of extensions may not be required.

The non-critical extension mechanism is the primary mechanism for introducing protocol extensions i.e. the critical extension mechanism is used merely when there is a need to introduce a 'clean' message version. Such a need appears when the last message version includes a large number of non-critical extensions, which results in issues like readability, overhead associated with the extension markers. The critical extension mechanism may also be considered when it is complicated to accommodate the extensions by means of non-critical extension mechanisms.

A.4.2 Critical extension of messages and fields

The mechanisms to critically extend a message are defined in A.3.3. There are both "outer branch" and "inner branch" mechanisms available. The "outer branch" consists of a CHOICE having the name *criticalExtensions*, with two values, *c1* and *criticalExtensionsFuture*. The *criticalExtensionsFuture* branch consists of an empty SEQUENCE, while the c1 branch contains the "inner branch" mechanism.

The "inner branch" structure is a CHOICE with values of the form "MessageName-rX-IEs" (e.g., "RRCConnectionReconfiguration-r8-IEs") or "spareX", with the spare values having type NULL. The "-rX-IEs" structures contain the complete structure of the message IEs for the appropriate release; i.e., the critical extension branch for the Rel-10 version of a message includes all Rel-8 and Rel-9 fields (that are not obviated in the later version), rather than containing only the additional Rel-10 fields.

The following guidelines may be used when deciding which mechanism to introduce for a particular message, i.e. only an 'outer branch', or an 'outer branch' in combination with an 'inner branch' including a certain number of spares:

- For certain messages, e.g. initial uplink messages, messages transmitted on a broadcast channel, critical extension may not be applicable.
- An outer branch may be sufficient for messages not including any fields.
- The number of spares within inner branch should reflect the likelihood that the message will be critically extended in future releases (since each release with a critical extension for the message consumes one of the spare values). The estimation of the critical extension likelihood may be based on the number, size and changeability of the fields included in the message.
- In messages where an inner branch extension mechanism is available, all spare values of the inner branch should be used before any critical extensions are added using the outer branch.

The following example illustrates the use of the critical extension mechanism by showing the ASN.1 of the original and of a later release

```
-- /example/ ASN1START
                                         -- Later release
RRCMessage ::=
                                        SEOUENCE {
   rrc-TransactionIdentifier
                                            RRC-TransactionIdentifier,
    criticalExtensions
                                                CHOICE {
                                                     CHOICE {
           rrcMessage-r8
                                                         RRCMessage-r8-IEs,
           rrcMessage-r10
                                                         RRCMessage-r10-IEs,
           rrcMessage-r11
                                                         RRCMessage-r11-IEs,
           rrcMessage-r14
                                                         RRCMessage-r14-IEs
       later
                                                   CHOICE {
            c2
                                                        CHOICE {
                rrcMessage-r16
                                                            RRCMessage-r16-IEs,
                spare7 NULL, spare6 NULL, spare5 NULL, spare4 NULL,
                spare3 NULL, spare2 NULL, spare1 NULL
            criticalExtensionsFuture
                                                    SEOUENCE {}
-- ASN1STOP
```

It is important to note that critical extensions may also be used at the level of individual fields i.e. a field may be replaced by a critically extended version. When sending the extended version, the original version may also be included (e.g. original field is mandatory, E-UTRAN is unaware if UE supports the extended version). In such cases, a UE supporting both versions may be required to ignore the original field. The following example illustrates the use of the critical extension mechanism by showing the ASN.1 of the original and of a later release.

```
-- /example/ ASN1START
                                        -- Original release
RRCMessage ::=
                                       SEOUENCE {
    rrc-TransactionIdentifier
                                           RRC-TransactionIdentifier,
    criticalExtensions
                                           CHOICE {
                                               CHOICE {
           rrcMessage-r8
                                                    RRCMessage-r8-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                           SEQUENCE {}
RRCMessage-rN-IEs ::= SEQUENCE {
    field1-rN
                                        ENUMERATED {
                                           value1, value2, value3, value4}
                                                                               OPTIONAL,
                                                                                          -- Need N
    field2-rN
                                       InformationElement2-rN
                                                                               OPTIONAL,
                                                                                          -- Need N
    nonCriticalExtension
                                       RRCConnectionReconfiguration-vMxy-IEs
                                                                              OPTIONAL
RRCConnectionReconfiguration-vMxy-IEs ::= SEQUENCE {
    field2-rM
                                             InformationElement2-rM
                                                                               OPTIONAL, -- Cond NoField2rN
    nonCriticalExtension
                                             SEQUENCE {}
                                                                                OPTIONAL
```

```
}
-- ASN1STOP
```

Conditional presence	Explanation	
NoField2rN	The field is optionally present, need N, if field2-rN is absent. Otherwise the field is absent	

Finally, it is noted that a critical extension may be introduced in the same release as the one in which the original field was introduced e.g. to correct an essential ASN.1 error. In such cases a UE capability may be introduced, to assist the network in deciding whether or not to use the critical extension.

In the case of list fields (SEQUENCE OF types in ASN.1) using the ToAddMod/ToRelease construction, the use of critical extensions to increase the size of a list should be avoided; that is, replacing the original list field by a new field also used to signal entries previously covered by the original field (i.e. extensions done according to the following example) should be avoided:

```
-- /example/ ASN1START -- Discouraged example

ContainingStructure ::= SEQUENCE {
    listElementToAddModList SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElement OPTIONAL, -- Need N
    ...,
    [[
    listElementToAddModList-rN SEQUENCE (SIZE (1..maxNrofListElements-rN)) OF ListElement OPTIONAL -- Need N
    ]]
}-- ASN1STOP
```

Instead, a non-critical list extension mechanism should typically be used, such that the extension field only adds the new entries of the list. This approach is further described in clause A.4.3.6.

If the critical extension mechanism for a list is used, it should be clarified in the field description that the two versions of the list are not configured together, and that the network should release the contents of the original version when configuring the replacement version.

A.4.3 Non-critical extension of messages

A.4.3.1 General principles

The mechanisms to extend a message in a non-critical manner are defined in A.3.3. W.r.t. the use of extension markers, the following additional guidelines apply:

- When further non-critical extensions are added to a message that has been critically extended, the inclusion of these non-critical extensions in earlier critical branches of the message should be avoided when possible.
- The extension marker ("...") is the primary non-critical extension mechanism that is used but empty sequences may be used if length determinant is not required. Examples of cases where a length determinant is not required:
 - at the end of a message;

- at the end of a structure contained in a BIT STRING or OCTET STRING.
- When an extension marker is available, non-critical extensions are preferably placed at the location (e.g. the IE) where the concerned parameter belongs from a logical/functional perspective (referred to as the 'default extension location').
- It is desirable to aggregate extensions of the same release or version of the specification into a group, which should be placed at the lowest possible level.
- In specific cases it may be preferable to place extensions elsewhere (referred to as the 'actual extension location') e.g. when it is possible to aggregate several extensions in a group. In such a case, the group should be placed at the lowest suitable level in the message.
- In case placement at the default extension location affects earlier critical branches of the message, locating the extension at a following higher level in the message should be considered.
- In case an extension is not placed at the default extension location, an IE should be defined. The IE's ASN.1 definition should be placed in the same ASN.1 clause as the default extension location. In case there are intermediate levels in-between the actual and the default extension location, an IE may be defined for each level. Intermediate levels are primarily introduced for readability and overview. Hence intermediate levels need not always be introduced e.g. they may not be needed when the default and the actual extension location are within the same ASN.1 clause.

A.4.3.2 Further guidelines

Further to the general principles defined in the previous clause, the following additional guidelines apply regarding the use of extension markers:

- Extension markers within SEQUENCE:
 - Extension markers are primarily, but not exclusively, introduced at the higher nesting levels.
 - Extension markers are introduced for a SEQUENCE comprising several fields as well as for information elements whose extension would result in complex structures without it (e.g. re-introducing another list).
 - Extension markers are introduced to make it possible to maintain important information structures e.g. parameters relevant for one particular RAT.
 - Extension markers are also used for size critical messages (i.e. messages on BCCH, BR-BCCH, PCCH and CCCH), although introduced somewhat more carefully.
 - The extension fields introduced (or frozen) in a specific version of the specification are grouped together using double brackets.
- Extension markers within ENUMERATED:
 - Spare values may be used until the number of values reaches the next power of 2, while the extension marker caters for extension beyond that limit, given that the use of spare values in a later Release is possible without any error cases.
 - A suffix of the form "vXYZ" is used for the identifier of each new value, e.g. "value-vXYZ".
- Extension markers within CHOICE:

- Extension markers are introduced when extension is foreseen and when comprehension is not required by the receiver i.e. behaviour is defined for the case where the receiver cannot comprehend the extended value (e.g. ignoring an optional CHOICE field). It should be noted that defining the behaviour of a receiver upon receiving a not comprehended choice value is not required if the sender is aware whether or not the receiver supports the extended value.
- A suffix of the form "vXYZ" is used for the identifier of each new choice value, e.g. "choice-vXYZ".

Non-critical extensions at the end of a message/ of a field contained in an OCTET or BIT STRING:

- When a nonCriticalExtension is actually used, a "Need" code should not be provided for the field, which always is a group including at least one extension and a field facilitating further possible extensions. For simplicity, it is recommended not to provide a "Need" code when the field is not actually used either.

Further, more general, guidelines:

- In case a need code is not provided for a group, a "Need" code is provided for all individual extension fields within the group i.e. including for fields that are not marked as OPTIONAL. The latter is to clarify the action upon absence of the whole group.

A.4.3.3 Typical example of evolution of IE with local extensions

The following example illustrates the use of the extension marker for a number of elementary cases (sequence, enumerated, choice). The example also illustrates how the IE may be revised in case the critical extension mechanism is used.

NOTE In case there is a need to support further extensions of release n while the ASN.1 of release (n+1) has been frozen, without requiring the release n receiver to support decoding of release (n+1) extensions, more advanced mechanisms are needed e.g. including multiple extension markers.

```
-- /example/ ASN1START
InformationElement1 ::=
                                    SEOUENCE {
    field1
                                        ENUMERATED {
                                           value1, value2, value3, value4-v880,
                                            ..., value5-v960 },
    field2
                                       CHOICE {
       field2a
                                            BOOLEAN,
       field2b
                                           InformationElement2b,
                                           InformationElement2c-r9
        field2c-v960
    },
    field3-r9
                                       InformationElement3-r9
                                                                    OPTIONAL
                                                                                    -- Need R
    11,
    11
    field3-v9a0
                                       InformationElement3-v9a0
                                                                   OPTIONAL,
                                                                                    -- Need R
    field4-r9
                                       InformationElement4
                                                                   OPTIONAL
                                                                                    -- Need R
    11
InformationElement1-r10 ::=
                                    SEQUENCE
    field1
                                            value1, value2, value3, value4-v880
```

```
value5-v960, value6-v1170, spare2, spare1, ... },
   field2
                                      CHOICE {
       field2a
                                          BOOLEAN.
       field2b
                                          InformationElement2b,
       field2c-v960
                                          InformationElement2c-r9.
       field2d-v12b0
                                          INTEGER (0..63)
   field3-r9
                                      InformationElement3-r10
                                                                      OPTIONAL, -- Need R
   field4-r9
                                                                     OPTIONAL, -- Need R
                                      InformationElement4
   field5-r10
                                      BOOLEAN.
   field6-r10
                                      InformationElement6-r10
                                                                     OPTIONAL, -- Need R
   [ [
   field3-v1170
                                      InformationElement3-v1170
                                                                      OPTIONAL
                                                                                 -- Need R
   11
-- ASN1STOP
```

Some remarks regarding the extensions of *InformationElement1* as shown in the above example:

- The *InformationElement1* is initially extended with a number of non-critical extensions. In release 10 however, a critical extension is introduced for the message using this IE. Consequently, a new version of the IE *InformationElement1* (i.e. *InformationElement1-r10*) is defined in which the earlier non-critical extensions are incorporated by means of a revision of the original field.
- The *value4-v880* is replacing a spare value defined in the original protocol version for *field1*. Likewise *value6-v1170* replaces *spare3* that was originally defined in the r10 version of *field1*.
- Within the critically extended release 10 version of *InformationElement1*, the names of the original fields/IEs are not changed, unless there is a real need to distinguish them from other fields/IEs. E.g. the *field1* and *InformationElement4* were defined in the original protocol version (release 8) and hence not tagged. Moreover, the *field3-r9* is introduced in release 9 and not re-tagged; although, the *InformationElement3* is also critically extended and therefore tagged *InformationElement3-r10* in the release 10 version of InformationElement1.

A.4.3.4 Typical examples of non critical extension at the end of a message

The following example illustrates the use of non-critical extensions at the end of the message or at the end of a field that is contained in a BIT or OCTET STRING i.e. when an empty sequence is used.

```
RRCMessage-v860-IEs ::=
   field4-v860
                             InformationElement4
                                                                   OPTIONAL, -- Need S
                                                                              -- Cond C54
   field5-v860
                                 BOOLEAN
                                                                   OPTIONAL,
   nonCriticalExtension
                                 RRCMessage-v940-IEs
                                                                   OPTIONAL
RRCMessage-v940-IEs ::=
                             SEQUENCE {
   field6-v940
                                 InformationElement6-r9
                                                                   OPTIONAL,
                                                                              -- Need R
   nonCriticalExtensions
                                 SEQUENCE {}
                                                                   OPTIONAL
-- ASN1STOP
```

Some remarks regarding the extensions shown in the above example:

- The *InformationElement4* is introduced in the original version of the protocol (release 8) and hence no suffix is used.

A.4.3.5 Examples of non-critical extensions not placed at the default extension location

The following example illustrates the use of non-critical extensions in case an extension is not placed at the default extension location.

ParentIE-WithEM

The IE *ParentIE-WithEM* is an example of a high level IE including the extension marker (EM). The root encoding of this IE includes two lower level IEs *ChildIE1-WithoutEM* and *ChildIE2-WithoutEM* which not include the extension marker. Consequently, non-critical extensions of the Child-IEs have to be included at the level of the Parent-IE.

The example illustrates how the two extension IEs *ChildIE1-WithoutEM-vNx0* and *ChildIE2-WithoutEM-vNx0* (both in release N) are used to connect non-critical extensions with a default extension location in the lower level IEs to the actual extension location in this IE.

ParentlE-WithEM information element

```
-- /example/ ASN1START
ParentIE-WithEM ::=
                                   SEOUENCE {
    -- Root encoding, including:
    childIE1-WithoutEM
                                       ChildIE1-WithoutEM
                                                                       OPTIONAL,
                                                                                   -- Need N
    childIE2-WithoutEM
                                       ChildIE2-WithoutEM
                                                                       OPTIONAL,
                                                                                       -- Need N
    ] ]
    childIE1-WithoutEM-vNx0
                                       ChildIE1-WithoutEM-vNx0
                                                                   OPTIONAL,
                                                                                   -- Need N
    childIE2-WithoutEM-vNx0
                                       ChildIE2-WithoutEM-vNx0
                                                                   OPTIONAL
                                                                                   -- Need N
    11
-- ASN1STOP
```

Some remarks regarding the extensions shown in the above example:

- The fields *childIEx-WithoutEM-vNx0* may not really need to be optional (depends on what is defined at the next lower level).
- In general, especially when there are several nesting levels, fields should be marked as optional only when there is a clear reason.

ChildIE1-WithoutEM

The IE *ChildIE1-WithoutEM* is an example of a lower level IE, used to control certain radio configurations including a configurable feature which can be setup or released using the local IE *ChIE1-ConfigurableFeature*. The example illustrates how the new field *chIE1-NewField* is added in release N to the configuration of the configurable feature. The example is based on the following assumptions:

- When initially configuring as well as when modifying the new field, the original fields of the configurable feature have to be provided also i.e. as if the extended ones were present within the setup branch of this feature.
- When the configurable feature is released, the new field should be released also.
- When omitting the original fields of the configurable feature the UE continues using the existing values (which is used to optimise the signalling for features that typically continue unchanged upon handover).
- When omitting the new field of the configurable feature the UE releases the existing values and discontinues the associated functionality (which may be used to support release of unsupported functionality upon handover to an eNB supporting an earlier protocol version).

The above assumptions, which affect the use of conditions and need codes, may not always apply. Hence, the example should not be re-used blindly.

ChildIE1-WithoutEM information element

```
-- /example/ ASN1START
ChildIE1-WithoutEM ::=
                                   SEQUENCE {
    -- Root encoding, including:
    chIE1-ConfigurableFeature
                                       ChIE1-ConfigurableFeature
                                                                       OPTIONAL
                                                                                      -- Need N
ChildIE1-WithoutEM-vNx0 ::=
                               SEOUENCE {
    chIE1-ConfigurableFeature-vNx0
                                       ChIE1-ConfigurableFeature-vNx0 OPTIONAL
                                                                                 -- Cond ConfigF
ChIE1-ConfigurableFeature ::=
                                   CHOICE {
    release
                                       NULL.
                                       SEQUENCE {
        -- Root encoding
ChIE1-ConfigurableFeature-vNx0 ::= SEQUENCE {
    chIE1-NewField-rN
                                       INTEGER (0..31)
```

-- ASN1STOP

Conditional presence	Explanation
ConfigF	The field is optional present, need R, in case of chlE1-ConfigurableFeature is included and set to "setup"; otherwise the field is absent and the UE
	shall delete any existing value for this field.

ChildIE2-WithoutEM

The IE *ChildIE2-WithoutEM* is an example of a lower level IE, typically used to control certain radio configurations. The example illustrates how the new field *chIE1-NewField* is added in release N to the configuration of the configurable feature.

ChildIE2-WithoutEM information element

```
-- /example/ ASN1START

ChildIE2-WithoutEM ::= CHOICE {
    release NULL,
    setup SEQUENCE {
    -- Root encoding
    }
}

ChildIE2-WithoutEM-vNx0 ::= SEQUENCE {
    chie2-NewField-rN INTEGER (0..31) OPTIONAL -- Cond Configf
}

-- ASN1STOP
```

Conditional presence	Explanation
ConfigF	The field is optional present, need R, in case of chIE2-ConfigurableFeature is included and set to "setup"; otherwise the field is absent and the UE
	shall delete any existing value for this field.

A.4.3.6 Non-critical extensions of lists with ToAddMod/ToRelease

When the size of a list using the ToAddMod/ToRelease construction is extended and/or fields are added to the list element structure, the list should be non-critically extended in accordance with the following general principles:

When only the size of the list is extended, this extension is reflected in a non-critical extension of the list, with a "SizeExt" suffix added to the end of the field name (before the -vNxy suffix). The differential size of the extended list uses the suffix "Diff". A new ToRelease list is needed, and its range should include only the increase in list size. In many cases, extending the list size will also require an extended list element ID type to account for the increased size of the list; in these cases the element type will need to be extended to include the extended element ID, resulting in a more complex extension (see example 3 for further discussion of this case). The field

description table should indicate that the UE considers the original list and the extension list as a single list; thus entries added with the original list can be modified by the extension list (or removed by the extension of the ToRelease list), or vice versa. The result is as shown in the following example:

```
-- /example 1/ ASN1START
ContainingStructure ::=
                             SEOUENCE {
   listElementToAddModList
                                 SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElement
                                                                                          OPTIONAL.
                                                                                                     -- Need N
   listElementToReleaseList
                                 SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementId
                                                                                          OPTIONAL,
                                                                                                    -- Need N
   11
   -- Non-critical extension lists
   OPTIONAL,
                                                                                                     -- Need N
   listElementToReleaseListSizeExt-vNxy SEQUENCE (SIZE (1..maxNrofListElementsDiff-rN)) OF ListElementId
                                                                                          OPTIONAL
                                                                                                     -- Need N
   11
  ASN1STOP
```

When fields are added to the list element structure, an extension marker should normally be used if available. If no extension marker is available or if overhead or other considerations prevent using the extension marker, an extension structure should be created for the new fields, with the suffix "Ext" added to the end of the field name and the element structure type name (before the -vNxy suffix), and a parallel ToAddMod list introduced to hold the new structures, also with the "Ext" suffix. The field description table should indicate that the parallel list contains the same number of entries, and in the same order, as the original list. No new ToRelease list is typically needed (unless the list element ID type changes). It should typically be ensured that the contained fields in the "Ext" elements are releasable without release and add of the entire list element; this can, for instance, be ensured by having the new fields be OPTIONAL Need R. If multiple extensions of the same list are needed, the version suffix should distinguish the lists (e.g. listElementToAddModListExt-vNwz) added after listElementToAddModListExt-vNxy). The result is as shown in the following example:

```
-- /example 2/ ASN1START
ContainingStructure ::=
                                    SEOUENCE {
    listElementToAddModList
                                        SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElement
                                                                                                              OPTIONAL,
                                                                                                                           -- Need N
    listElementToReleaseList
                                        SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementId
                                                                                                              OPTIONAL,
                                                                                                                           -- Need N
    . . . .
    11
    -- Parallel list
   listElementToAddModListExt-vNxy
                                        SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementExt-vNxy
                                                                                                              OPTIONAL
                                                                                                                           -- Need N
    -- Second parallel list from a later spec version
    listElementToAddModListExt-vNwz
                                        SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementExt-vNwz
                                                                                                              OPTIONAL
                                                                                                                          -- Need N
    ]]
ListElement ::=
                                     SEOUENCE {
    elementId
                                         ListElementId,
    field1
                                         INTEGER (0..3),
    field2
                                         ENUMERATED { value1, value2, value3 }
```

```
ListElementExt-vNxy ::= SEQUENCE {
    field3-rN BIT STRING (SIZE (8)) OPTIONAL -- Need R
}
ListElementExt-vNwz ::= SEQUENCE {
    field4-rN INTEGER (0..255) OPTIONAL -- Need R
}
-- ASN1STOP
```

When the size of a list is extended and fields are added to the list element structure, an extension marker should normally be used for the added fields if available, and the list extended with the non-critical mechanism as described in example 1 above. Note that if the list element ID type changes in this case, the new ID can be added after the extension marker, and the entries of the size-extended ToRelease list should have the type of the new ID (e.g. *ListElementId-vNxy*). If no extension marker is available or if overhead or other considerations prevent using the extension marker, an extension structure should be created for the new fields and a parallel list with ToAddMod introduced to hold the extension structures, as in the second example above, for entries of the original list and for entries of the extension list holding new entries. The field description table should indicate that the parallel list contains the same number of entries, and in the same order, as the concatenation of the original list and the extension list. An extended ToRelease list is needed, but no additional parallel ToRelease list is needed (i.e. there is no *listElementToReleaseListExt-vNxy* in the example below), as the original and extended ToRelease lists suffice to release any element of the combined list. The extended element ID type should be captured as a non-critical extension of the original element ID type, with the field description indicating that if the extended ID is present, the original ID is ignored. The result is as shown in the following example:

```
-- /example 3/ ASN1START
ContainingStructure ::=
                                 SEOUENCE {
   listElementToAddModList
                                                                                                         OPTIONAL.
                                      SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElement
                                                                                                                     -- Need N
   listElementToReleaseList
                                      SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementId
                                                                                                         OPTIONAL,
                                                                                                                     -- Need N
   11
    -- Non-critical extension lists
   OPTIONAL,
                                                                                                                     -- Need N
   listElementToReleaseListSizeExt-vNxy SEQUENCE (SIZE (1..maxNrofListElementsDiff-rN)) OF ListElementId-vNxy
                                                                                                         OPTIONAL,
                                                                                                                     -- Need N
    -- Parallel list with maxNrofListElements-rN = maxNrofListElements + maxNrofListElementsDiff-rN
   listElementToAddModListExt-vNxy
                                     SEQUENCE (SIZE (1..maxNrofListElements-rN)) OF ListElementExt-vNxy
                                                                                                         OPTIONAL
                                                                                                                     -- Need N
   11
ListElement ::=
                                  SEQUENCE {
   elementId
                                     ListElementId,
   field1
                                     INTEGER (0..3),
    field2
                                     ENUMERATED { value1, value2, value3 }
ListElementExt-vNxy ::=
                                 SEOUENCE {
    -- Field description should indicate that if the elementId-vNxy is present, the elementId (without suffix) is ignored
   elementId-vNxy
                                     ListElementId-vNxy
                                                                                                   OPTIONAL,
                                                                                                               -- Need S
   field3-rN
                                                                                                               -- Need R
                                     BIT STRING (SIZE (8))
                                                                                                   OPTIONAL
ListElementId ::= INTEGER (0..maxNrofListElements-1)
ListElementId-vNxy ::= INTEGER (maxNrofListElements..maxNrofListElements-1-rN)
```

-- ASN1STOP

When different extensions are made to a list in separate releases, the extension mechanisms described above may interact. In case fields are added in Rel-M (listElementToAddModListExt-vMxy) and later the list size is extended in Rel-N (listElementToAddModListSizeExt-vNwz), the size-extended list in Rel-N should be a single list extending the combination of listElementToAddModList and listElementToAddModListExt-vMxy. This requires creating a new type (ListElement-rN) to contain the combined fields of ListElement and ListElementExt-vMxy. A corresponding ToRelease list is needed. The result is as shown in the following example:

```
-- /example 4/ ASN1START
ContainingStructure ::=
                                    SEQUENCE {
    listElementToAddModList
                                         SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElement
                                                                                                             OPTIONAL,
                                                                                                                          -- Need N
    listElementToReleaseList
                                         SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementId
                                                                                                             OPTIONAL,
                                                                                                                          -- Need N
    [ [
    -- Parallel list (Rel-M)
    listElementToAddModListExt-vMxy
                                         SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementExt-vMxy
                                                                                                             OPTIONAL
                                                                                                                          -- Need N
    11,
    11
    -- Size-extended list (Rel-N) with maxNrofListElements-rN = maxNrofListElements + maxNrofListElementsDiff-rN
    listElementToAddModListSizeExt-vNwz SEQUENCE (SIZE (1..maxNrofListElementsDiff-rN)) OF ListElement-rN OPTIONAL,
                                                                                                                          -- Need N
    listElementToReleaseListSizeExt-vNwz SEQUENCE (SIZE (1..maxNrofListElementsDiff-rN)) OF ListElementId-vNwz
                                                                                                                   OPTIONAL -- Need N
    11
ListElement ::=
                                     SEOUENCE {
    elementId
                                         ListElementId,
    field1
                                         INTEGER (0..3),
    field2
                                         ENUMERATED { value1, value2, value3 }
ListElementExt-vMxy ::=
                                     SEQUENCE {
    field3-rM
                                         BIT STRING (SIZE (8))
                                                                                                            OPTIONAL
                                                                                                                         -- Need R
ListElement-rN ::=
                                     SEOUENCE {
    elementId-vNwz
                                         ListElementId-vNwz,
    field1
                                         INTEGER (0..3),
    field2
                                         ENUMERATED { value1, value2, value3 },
    field3-rN
                                         BIT STRING (SIZE (8))
                                                                                                            OPTIONAL
                                                                                                                         -- Need R
ListElementId ::= INTEGER (0..maxNrofListElements-1)
ListElementId-vNwz ::= INTEGER (maxNrofListElements..maxNrofListElementsDiff-1-rN)
-- ASN1STOP
```

A.5 Guidelines regarding inclusion of transaction identifiers in RRC messages

The following rules provide guidance on which messages should include a Transaction identifier

- 1: DL messages on CCCH that move UE to RRC-Idle should not include the RRC transaction identifier.
- 2: All network initiated DL messages by default should include the RRC transaction identifier.
- 3: All UL messages that are direct response to a DL message with an RRC Transaction identifier should include the RRC Transaction identifier.
- 4: All UL messages that require a direct DL response message should include an RRC transaction identifier.
- 5: All UL messages that are not in response to a DL message nor require a corresponding response from the network should not include the RRC Transaction identifier.

A.6 Guidelines regarding use of need codes

The following rule provides guidance for determining need codes for optional downlink fields:

- if the field needs to be stored by the UE (i.e. maintained) when absent:
 - use Need M (=Maintain);
- else, if the field needs to be released by the UE when absent:
 - use Need R (=Release);
- else, if UE shall take no action when the field is absent (i.e. UE does not even need to maintain any existing value of the field):
 - use Need N (=None);
- else (UE behaviour upon absence does not fit any of the above conditions):
 - use Need S (=Specified);
 - specify the UE behaviour upon absence of the field in the procedural text or in the field description table.

A.7 Guidelines regarding use of conditions

Conditions are primarily used to specify network restrictions, for which the following types can be distinguished:

- Message Contents related constraints e.g. that a field B is mandatory present if the same message includes field A and when it is set value X.

- Configuration Constraints e.g. that a field D can only be signalled if field C is configured and set to value Y. (i.e. regardless of whether field C is present in the same message or previously configured).

The use of these conditions is illustrated by an example.

```
-- /example/ ASN1START
RRCMessage-IEs ::= SEQUENCE {
    fieldA
                                  FieldA
                                                         OPTIONAL, -- Need M
    fieldB
                                  FieldB
                                                         OPTIONAL, -- Cond FieldAsetToX
                                                         OPTIONAL, -- Need M
    fieldC
                                  FieldC
    fieldD
                                  FieldD
                                                         OPTIONAL. -- Cond FieldCsetToY
   nonCriticalExtension
                                  SEQUENCE {}
                                                         OPTIONAL
-- /example/ ASN1STOP
```

Conditional presence	Explanation
FieldAsetToX	The field is mandatory present if fieldA is included and set to valueX. Otherwise the field
	is optionally present, need R.
FieldCsetToY	The field is optionally present, need M, if fieldC is configured and set to valueY. Otherwise
	the field is absent and the UE does not maintain the value

A.8 Miscellaneous

The following miscellaneous convention should be used:

- UE capabilities: TS 38.306 [26] specifies that the network should in general respect the UE's capabilities. Hence there is no need to include statement clarifying that the network, when setting the value of a certain configuration field, shall respect the related UE capabilities unless there is a particular need e.g. particularly complicated cases.

Annex B (informative): RRC Information

B.1 Protection of RRC messages

The following list provides information which messages can be sent (unprotected) prior to AS security activation and which messages can be sent unprotected after AS security activation. Those messages indicated "-" in "P" column should never be sent unprotected by gNB or UE. Further requirements are defined in the procedural text.

- P...Messages that can be sent (unprotected) prior to AS security activation
- A I...Messages that can be sent without integrity protection after AS security activation
- A C...Messages that can be sent unciphered after AS security activation
- NA... Message can never be sent after AS security activation

Message	Р	A-I	A-C	Comment
CounterCheck	-	-	-	
CounterCheckResponse	-	-	-	
DedicatedSIBRequest	+	-	-	
DLDedicatedMessageSegment	NOTE 1		-	
DLInformationTransfer	+	-	-	
DLInformationTransferMRDC	-	-	-	
FailureInformation	-	-	-	
LocationMeasurementIndication	-	-	-	
MCGFailureInformation	-	-	-	
MeasurementReportAppLayer	-	-	-	
MBSBroadcastConfiguration	+	+	+	
MBSInterestIndication	-	-	-	
MIB	+	+	+	
MeasurementReport	-	-	-	Measurement configuration may be sent prior to AS security activation. But: In order to protect privacy of UEs, MeasurementReport is only sent from the UE after successful AS security activation.
MobilityFromNRCommand	-	-	-	
Paging	+	+	+	
RRCReconfiguration	+	-	-	The message shall not be sent unprotected before AS security activation if it is used to perform handover or to establish SRB2, SRB4, multicast MRBs and DRBs.
RRCReconfigurationComplete	+	-	-	Unprotected, if sent as response to RRCReconfiguration which was sent before AS security activation.
RRCReestablishment	-	-	+	Integrity protection applied, but no ciphering.
RRCReestablishmentComplete	-	-	-	
RRCReestablishmentRequest	-	-	+	This message is not protected by PDCP operation. However, a shortMAC-I is included.
RRCReject	+	+	+	Justification for A-I and A-C: the message can be sent in SRB0 in RRC_INACTIVE state, after the AS security is activated.
RRCRelease	+	-	-	Justification for P: If the RRC connection only for signalling not requiring DRBs or ciphered messages, or the signalling connection has to be released prematurely, this message is sent as unprotected. RRCRelease message sent before AS security activation cannot include deprioritisationReq, suspendConfig, redirectedCarrierInfo, cellReselectionPriorities information fields.
RRCResume	-	-	-	
RRCResumeComplete	-	-	-	
RRCResumeRequest	-	-	+	This message is not protected by PDCP operation. However, a resumeMAC-I is included.
RRCResumeRequest1	-	-	+	This message is not protected by PDCP operation. However, a resumeMAC-I is included.
RRCSetup	+	+	+	Justification for A-I and A-C: the message can be sent in SRB0 in RRC_INACTIVE or RRC_CONNECTED states, after the AS security is activated.
RRCSetupComplete	+	NA	NA	
RRCSetupRequest	+	NA	NA	
RRCSystemInfoRequest	+	+	+	Justification for A-I and A-C: the message can be sent in SRB0 in RRC_INACTIVE state, after the AS security is activated.
SIB1	+	+	+	
SCGFailureInformation	-	-	-	
SCGFailureInformationEUTRA	-	-	-	
SecurityModeCommand	+	NA	NA	Integrity protection applied, but no ciphering (integrity verification done after the message received by RRC).

Message	Р	A-I	A-C	Comment
SecurityModeComplete	-	-	+	The message is sent after AS security activation. Integrity protection applied, but no ciphering. Ciphering is applied after completing the procedure.
SecurityModeFailure	+	NA	NA	Neither integrity protection nor ciphering applied.
SidelinkUEInformationNR	+	-	-	The message shall not be sent unprotected before AS security activation if sl- CapabilityInformationSidelink information field is included in the message.
SystemInformation	+	+	+	
UEAssistanceInformation	-	-	-	
UECapabilityEnquiry	+	-	-	The network should retrieve UE capabilities only after AS security activation.
UECapabilityInformation	+	-	-	
ULDedicatedMessageSegment	+	-	-	
UEInformationRequest	-	-	-	
UEInformationResponse	-	-	-	In order to protect privacy of UEs, <i>UEInformationResponse</i> is only sent from the UE after successful security activation
UEPositioningAssistanceInfo	-	-	-	
ULInformationTransfer	+	-	-	
ULInformationTransferIRAT	NOTE 2			
ULInformationTransferMRDC	-	-	-	

NOTE 1: This message type carries segments of other RRC messages. The protection of an instance of this message is the same as for the message which this message is carrying.

NOTE 2: This message type carries others RRC messages. The protection of an instance of this message is the same as for the message which this message is carrying.

B.2 Description of BWP configuration options

There are two possible ways to configure BWP#0 (i.e. the initial BWP) for a UE:

- 1) Configure BWP-DownlinkCommon and BWP-UplinkCommon in ServingCellConfigCommon, but do not configure dedicated configurations in BWP-DownlinkDedicated or BWP-UplinkDedicated in ServingCellConfig.
- 2) Configure both *BWP-DownlinkCommon* and *BWP-UplinkCommon* in *ServingCellConfigCommon* and configure dedicated configurations in at least one of *BWP-DownlinkDedicated* or *BWP-UplinkDedicated* in *ServingCellConfig*.

The same way of configuration is used for UL BWP#0 and DL BWP#0 if both are configured.

With the first option (illustrated by figure B2-1 below), the BWP#0 is not considered to be an RRC-configured BWP, i.e., UE only supporting one BWP can still be configured with BWP#1 in addition to BWP#0 when using this configuration. The BWP#0 can still be used even if it does not have the dedicated configuration, albeit in a more limited manner since only the SIB1-defined configurations are available. For example, only DCI format 1_0 can be used with BWP#0 without dedicated configuration, so changing to another BWP requires RRCReconfiguration since DCI format 1_0 doesn't support DCI-based switching.

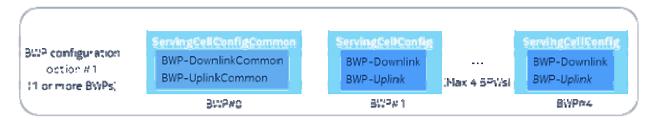


Figure B2-1: BWP#0 configuration without dedicated configuration

With the second option (illustrated by figure B2-2 below), the BWP#0 is considered to be an RRC-configured BWP, i.e. UE only supporting one BWP cannot be configured with BWP#1 in addition to BWP#0 when using this configuration. However, UE supporting more than one BWP can still switch to and from BWP#0 e.g. via DCI normally, and there are no explicit limitations to using the BWP#0 (compared to the first option).

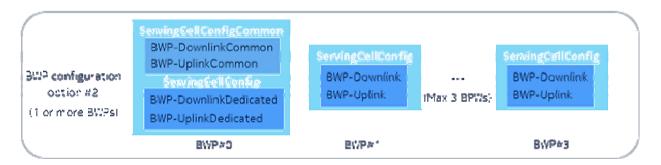


Figure B2-2: BWP#0 configuration with dedicated configuration

For BWP#0, the BWP-DownlinkCommon and BWP-UplinkCommon in ServingCellConfigCommon should match the parameters configured by MIB and SIB1 (if provided) in the corresponding serving cell.

If a RedCap-specific initial UL/DL BWP is configured, for BWP switching, the BWP #0 always maps to the RedCap-specific initial UL/DL BWP.

Annex C (normative):List of CRs Containing Early Implementable Features and Corrections

This annex lists the Change Requests (CRs) whose changes may be implemented by a UE of an earlier release than which the CR was approved in (i.e. CRs that contain on their coversheets the sentence "Implementation of this CR from Rel-N will not cause interoperability issues").

Table C-1: List of CRs Containing Early Implementable Features and Corrections

TDoc Number (RP-xxxxxx): CR Title	CR Number(s)	CR Revision Number(s)	Earliest Implementable Release	Additional Information
RP-200335: Correction on usage of access category 2 for UAC for RNA update	1141	2	Release 15	
RP-201185: Introduction of signalling for high-speed train scenarios	1464	5	Release 15	
RP-201216: Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2	1665	2	Release 15	Early implementation part is referring to the aspect covered by - R2-2006203: Extension of CSI-RS capabilities per codebook type - R2-2006360: Intraband EN_DC power class expansion for 29 dBm
RP-202768: UE behaviour when UL 7.5KHz shift is not supported	2107	2	Release 15	
RP-202790: Correction on uac- AccessCategory1- SelectionAssistanceInfo	2130	1	Release 15	
RP-211483: Clarification on the initiation of RNA update	2581	1	Release 15	
RP-201190: Introduction of eCall over IMS for NR	1670	-	Release 15	
RP-212598: Distinguishing support of extended band n77	2810	2	Release 15	
RP-213342: Duty cycle signalling for power class 1.5	2817	1	Release 15	
RP-213345: CR on 38.331 for introducing UE capability of txDiversity	2859	1	Release 15	
RP-220497: Introduction of function for RRM enhancements for Rel-17 NR FR1 HST	2898	2	Release 16	
RP-220838: Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331)	2901	1	Release 15	Early implementation part is referring to the aspect covered by: - R2-2203898: Introduction of BCS4 and BCS5 - R2-2203836: Introducing UE capability for power class 5 for FR2 FWA
RP-221721: CR on the CBM/IBM reporting-38331	2916	2	Release 16	
RP-221736: Distinguishing support of band n77 restrictions in Canada [n77 Canada]	3078	2	Release 15	

1273	
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RP-222527: Correction to	3476	-	Release 15	
additionalSpectrumEmission for				
UL CA in n77 for the US				
RP-222527: Correction to	3478	-	Release 15	
additionalSpectrumEmission for				
UL CA in n77 for Canada				

Annex D (normative): UE requirements on ASN.1 comprehension

This clause specifies UE requirements regarding the ASN.1 transfer syntax support, i.e. the ASN.1 definitions to be comprehended by the UE.

A UE that indicates release X in field *accessStratumRelease* shall comprehend the entire transfer syntax (ASN.1) of release X, in particular at least the first version upon ASN.1 freeze. The UE is however not required to support dedicated signalling related transfer syntax associated with optional features it does not support.

In case a UE that indicates release X in field *accessStratumRelease* supports a feature specified in release Y, which is later than release X, (i.e. early UE implementation) additional requirements apply. The UE obviously also has to support the ASN.1 parts related to indicating support of the feature (in UE capabilities).

Critical extensions (dedicated signaling)

If the early implemented feature involves one or more critical extensions in dedicated signalling, the UE shall comprehend the parts of the transfer syntax (ASN.1) of release Y that are related to the feature implemented early. This, in particular, concerns the ASN.1 parts related to configuration of the feature.

If configuration of an early implemented feature introduced in release Y involves a message or field that has been critically extended, the UE shall support configuration of all features supported by the UE that are associated with sub-fields of this critical extension. Apart from the early implemented feature(s), the UE needs, however, not to support functionality beyond what is defined in the release the UE indicates in access stratum release.

Let's consider the example of a UE indicating value X in field *accessStratumRelease* that supports the features A1, A3, and A5, associated with fields *fieldA1*, *fieldA3* and *fieldA5* of *InformationElementA* (see ASN.1 below).

The feature A5 implemented early is associated with *fieldA5*, and can only be configured by the -rY version of *InformationElementA*. In such case, the UE should support configuration of all the features A1, A3 and A5 associated with fields *fieldA1*, *fieldA3* and *fieldA5* by the -rY version of *InformationElementA*.

If, however, one of the features was modified, e.g. the feature A3 associated with *fieldA3*, the network should assume the UE only supports the feature A3 according to the release it indicated in field *accessStratumRelease* (i.e. X).

The UE is neither required to support the additional code-point (n80-vY0) nor the additional sub-field (fieldA3c-rY).

```
InformationElementA-rX ::=
                               SEOUENCE {
    fieldA1-rX
                                  InformationElementA1-rX
                                                                          OPTIONAL, -- Need N
    fieldA2-rX
                                  InformationElementA2-rX
                                                                          OPTIONAL, -- Need R
                                                                                     -- Need R
    fieldA3-rX
                                  InformationElementA3-rX
                                                                          OPTIONAL
InformationElementA-rY ::=
                                   InformationElementA1-rX
                                                                          OPTIONAL,
                                                                                     -- Need N
    fieldA1-rY
    fieldA2-rY
                                   InformationElementA2-rX
                                                                          OPTIONAL, -- Need R
    fieldA3-rY
                                   InformationElementA3-rY
                                                                          OPTIONAL, -- Need R
                                                                          OPTIONAL, -- Need R
    fieldA4-rY
                                   InformationElementA4-rY
    fieldA5-rY
                                   InformationElementA5-rY
                                                                          OPTIONAL
                                                                                     -- Need R
InformationElementA3-rX ::= SEQUENCE {
    fieldA3a-rX
                                   InformationElementA3a-rX
                                                                          OPTIONAL, -- Need N
```

Non-critical extensions (dedicated and broadcast signaling)

If the early implemented feature involves one or more non-critical extensions, the UE shall comprehend the parts of the transfer syntax (ASN.1) of release Y that are related to the feature implemented early.

If the early implemented feature involves one or more non-critical extensions in dedicated signaling, the network does not include extensions introduced after the release X that are not the parts related to the feature which the UE indicates early support of in UE capabilities. The UE shall anyway comprehend the parts of the transfer syntax (ASN.1) which indicate absence of such extensions.

If the early implemented feature involves one or more non-critical extensions in system information, the SIB(s) containing the release Y fields related to the early implemented features may also include other extensions introduced after the release X that are not the parts related to the feature which the UE supports. The UE shall comprehend such intermediate fields (but again is not required to support the functionality associated with these intermediate fields, in case this concerns optional features not supported by the UE).

Annex E (informative): Change history

						Change history	
Date	Meeti	TDoc	CR	R	С	Subject/Comment	New
	ng	.500		ev	at	Guajosa Gommon	versio n
04/2017	#97bis	R2-1703395					0.0.1
04/2017	RAN2 #97bis	R2-1703922					0.0.2
05/2017	RAN2 #98	R2-1705815					0.0.3
06/2017	RAN2 #NR2	R2-1707187					0.0.4
08/2017	#99	R2-1708468					0.0.5
09/2017	#99bis	R2-1710557					0.1.0
11/2017	#100	R2-1713629					0.2.0
11/2017	#100	R2-1714126					0.3.0
12/2017	#100	R2-1714259					0.4.0
12/2017	8	RP-172570				Submitted for Approval in RAN#78	1.0.0
12/2017	RP#7 8					Upgraded to Rel-15 (MCC)	15.0.0
03/2018	9	RP-180479	8000	1	F	Corrections for EN-DC (Note: the clause numbering between 15.0.0 and 15.1.0 has changed in some cases).	15.1.0
06/2018		RP-181326	0042	7	F	Miscellaneous EN-DC corrections	15.2.0
	RP-80					Correction: Duplicate Foreword clause removed & ASN.1 clauses touched up	15.2.1
09/2018		RP-181942	0100	4	F	Introduction of SA	15.3.0
12/2018		RP-182656	0179	3	F	Handling of Resume Failure	15.4.0
		RP-182651	0187	1	F	Clarification on the presence of ra-ResponseWindow	15.4.0
		RP-182656	0188	3	F	Addition of RAN specific Access Category	15.4.0
		RP-182653	0199	2	F	CR for TS38.331 on MIB	15.4.0
		RP-182653	0200	1	F	CR for TS38.331 on PDCCH-ConfigSIB	15.4.0
		RP-182661	0202	2	F	Handling Cell Reselection during SI Request	15.4.0
		RP-182649	0213	2	F	Corrections on security field descriptions	15.4.0
		RP-182649	0216	2	F	Remain issue for T302	15.4.0
		RP-182649	0219	1	F	[C204] Handling of timer T380	15.4.0
		RP-182655	0229	2	F	Clarification on configured grant timer in 38.331	15.4.0
		RP-182663	0232	2	F	CR for ServingCellConfigCommon in 38.331	15.4.0
		RP-182659	0234	3	F	Introduction of cell level rate matching parameters in ServingCellConfig	15.4.0
		RP-182650	0235	2	F	CR for introducing PSCell frequency in CG-Config	15.4.0
		RP-182650	0236	2	F	CR for security handling for eLTE in 38.331	15.4.0
			0237		F	Handling on simultaneously triggered NAS&AS events (I770)	15.4.0
			0238		F	Handling on security keys for resume procedure (I774)	15.4.0
			0239	5	F	RIL I556, I557, I558 on RB handling when resuming	15.4.0
<u> </u>			0242	2	F	Security for RRC connection release	15.4.0
		RP-182650	0243	4	F	Corrections on reestablishment and security procedures	15.4.0
		RP-182650	0244	1	F	RIL I118 on release case to upper layers for CN paging for a UE in RRC_INACTIVE	15.4.0
		RP-182650	0246	2	F	CR on SI request procedure in TS38.331	15.4.0
		RP-182650	0248	2	F	CR to 38331 on ul-DataSplitThreshold for SRB	15.4.0
		RP-182652	0249	2	F	Clarification of guami-Type	15.4.0
		RP-182652	0252	1	F	CR to 38.331 on Protection of RRC messages Table	15.4.0
		RP-182663	0254	2	F	Access barring check after handover	15.4.0
		RP-182663	0259	3	F	Stop of T390 and related UE actions	15.4.0
		RP-182657	0260	4	F	Corrections for handover between NR and E-UTRA	15.4.0
		RP-182738	0267		F	CR on ssb-ToMeasure in MeasurementTimingConfiguration	15.4.0
	RP-82	RP-182659	0269	3	F	Clarification of the applicability of 38.331 to EN-DC	15.4.0

RP-	-82	RP-182654	0270	3	F	Clarification on the smtc signalled for intra-NR handover, PSCell change or	15.4.0
DD	00	DD 400054	0070	2	_	SCell addition	45.40
		RP-182654 RP-182654	0273 0275	3	F F	CR on fallback to the setup procedure Correction on cell sorting for periodical measurement reporting	15.4.0 15.4.0
		RP-182660	0273	2	F	Measurement related actions upon re-establishment	15.4.0
		RP-182654	0278	1	F	CR on threshold description for cell quality derivation	15.4.0
		RP-182654	0282	1	F	CR to avoid unnecessary L3 filtered beam measurements	15.4.0
		RP-182660	0283	2	F	CR on CGI reporting	15.4.0
		RP-182660	0291	3	F	Additional UE capabilities for NR standalone	15.4.0
		RP-182667	0294	4	F	NR RRC Processing Time	15.4.0
		RP-182812	0295	5	F	Update of L1/RF capabilities	15.4.0
		RP-182651	0296	2	F	UE configuration on re-establishment procedure	15.4.0
		RP-182651	0298	2	F	SIB size limitation [M201]	15.4.0
		RP-182651	0299	2	F	Correction on SRS-TPC-CommandConfig	15.4.0
		RP-182651 RP-182666	0302 0307	4	F F	Clarification on counter check procedure CR on the Clarification for the Support of the Delay Budget Report in NR	15.4.0 15.4.0
		RP-182666	0307	3	F	ssb-PositionsInBurst correction	15.4.0
		RP-182666	0325	3	F	Barring behaviour when SIB1 reception fails	15.4.0
		RP-182666	0329	5	F	System Information Storing and Validity Clarifications and Corrections	15.4.0
		RP-182666	0330	3	F	SIBs required before initiating connection	15.4.0
		RP-182652	0333	1	F	On contens of measObjectEUTRA	15.4.0
		RP-182654	0335	2	F	A3 and A5 corrections – neighbouring cell definition	15.4.0
		RP-182650	0339	2	F	SI reception in RRC Connected mode (RIL#II611)	15.4.0
RP-	-82	RP-182650	0340	2	F	Miscellaneous corrections on SI procedures	15.4.0
		RP-182652	0342	1	F	On RRM measurements related procedual text corrections	15.4.0
		RP-182651	0344	1	F	Clarification for absense of nr-NS-PmaxList IE	15.4.0
		RP-182652	0345	2	F	Clarification on paging in connected mode	15.4.0
		RP-182651	0350	2	F	ASN.1 correction to fr-InfoListSCG in CG-Config	15.4.0
		RP-182661	0355	2	F	Update of L2 capability parameters	15.4.0
		RP-182651	0364	1	F F	Procedures for full config at RRCResume Clarification of PDCP-Config field descriptions	15.4.0 15.4.0
		RP-182651 RP-182653	0365 0368	2	F	UE Context handling during handover to NR	15.4.0
		RP-182652	0300	2	F	[E255] CR to 38.331 on corrections related to CGI reporting timer T321	15.4.0
		RP-182655	0375	3	F	R2-1817981 CR to 38.331 on pendingRnaUpdate setting	15.4.0
		RP-182653	0376	2	F	Introducing procedure for reporting RLC failures	15.4.0
		RP-182654	0379	2	F	Correction of frequency band indication in MeasObjectNR	15.4.0
		RP-182654	0382	2	F	RRC connection release triggered by upper layers	15.4.0
		RP-182660	0384	3	F	Correction to configuration of measurement object	15.4.0
		RP-182665	0388	3	F	Correction to 38331 in SRS-Config	15.4.0
		RP-182657	0391	2	F	Correction for PowerControl-related issues	15.4.0
		RP-182668	0395	4	F	Inter-band EN-DC Configured Output Power requirements	15.4.0
		RP-182655	0396	2	F	E573 Configuration of SRB1 during Resume	15.4.0
		RP-182655	0402 0406	2	F F	Triggers for abortion of RRC establishment Correction on CN type indication for Redirection from NR to E-UTRA	15.4.0 15.4.0
		RP-182656 RP-182664	0406		F	Miscellaneous minor corrections	15.4.0
		RP-182654	0410		F	Invalidation of L1 parameter nrofCQIsPerReport	15.4.0
		RP-182654	0411	1	F	Clarifications on RNA update and CN registration (N023)	15.4.0
			0412	3	F	Missing optionality bit in CG-ConfigInfo	15.4.0
		RP-182662	0414	2	F	Clarification for the implementation of UE feature list item 6-1 (BWP op1)	15.4.0
		RP-182654	0417	1	F	Clarification on ssb-PositionsInBurst	15.4.0
		RP-182667	0418	3	F	Correction to commonControlResourceSet	15.4.0
		RP-182667	0420	2	F	Correction to TDD configuration in SIB1	15.4.0
		RP-182668	0421		F	Clarification on handling of default parameters	15.4.0
		RP-182663	0429	2	F	SRB3 integrity protection failure handling	15.4.0
		RP-182653	0431	2	F	Corrections to the field decriptions of System Information	15.4.0
		RP-182653	0434	1	F	Correction to SI provision in connected mode	15.4.0
		RP-182661	0436	3	F	PDCCH Monitoring Occasions in SI Window	15.4.0
		RP-182655 RP-182652	0438 0439	3	F F	CR on SI Message Acquisition Update of nas-SecurityParamFromNR according to LS from SA3	15.4.0 15.4.0
		RP-182652 RP-182652	0439	2	F	Correction to Default MAC Cell Group configuration	15.4.0
		RP-182652	0445	1	F	Correction to Delauti MAC Cell Gloup configuration Correction to missing field descriptions of PLMN Identity	15.4.0
		RP-182657	0448	2	F	Introducing PDCP suspend procedure	15.4.0
		RP-182657	0449	2	F	Correction to PDCP statusReportRequired	15.4.0
		RP-182664	0454		F	CR to 38.331 on the ambiguity of targetCellIdentity in	15.4.0
						Resume/Reestablishment MAC-I calculation	
		RP-182655	0457	1	F	Corrections on P-Max description	15.4.0
		RP-182651	0460	2	F	Clarification on Configuration of multiplePHR for EN-DC and NR-CA	15.4.0
		RP-182656	0469		F	Correction on conditional presence of PCellOnly	15.4.0
		RP-182657	0474		F	Introduction of power boosting indicator for pi2BPSK waveform	15.4.0
		RP-182655	0475		F F	Correction on the allowedBC-ListMRDC	15.4.0
IRP-	-02	RP-182649	0476		Г	Removal of restriction on RB removal and addition	15.4.0

RP-82 RP-182661 0492 2 F Correction to full configuration RP-82 RP-182664 0492 3 F CR on MeasurementTimingConfiguration RP-82 RP-182664 0502 1 F Bandwidth configuration for initial BWP RP-82 RP-182664 0503 4 F CORESET#O configuration when SIB1 is not broadcast RP-82 RP-182663 0506 1 F Correction on the behaviors with cell reselection while T302 is running RP-82 RP-182663 0509 2 F Correction on SDAP reconfiguration handling RP-82 RP-182663 0510 1 F Correction on SDAP reconfiguration handling RP-82 RP-182663 0510 1 F Correction on SDAP reconfiguration handling RP-82 RP-182663 0510 1 F Correction to description of parameter Ns nAndPagingFrameOffset RP-82 RP-182664 0515 F Correction to description of parameter Ns nAndPagingFrameOffset RP-82 RP-182664 0516 F Correction to description of parameter Ns RP-82 RP-182664 0516 F Correction to description of parameter Ns RP-82 RP-182664 0516 F Correction to description of parameter Ns RP-82 RP-182664 0518 F CR on UP Dehaviour after SI Acquisition Failure RP-82 RP-182665 0520 1 F Can Interval of SI Acquisition Failure RP-82 RP-182665 0520 1 F Can powerControlOffset RP-82 RP-182666 0520 1 F Can powerControlOffset RP-82 RP-182666 0539 1 F Correction to configuration of firstPDCCH-MonitoringOccasionOfPO RP-82 RP-182664 0541 F Correction to no barring configuration for Implicit UAC RP-82 RP-182664 0541 F Correction to Access Category and barring config determination for implicit access barring RP-82 RP-182669 0555 1 F Correction for SSB power RP-82 RP-182669 0565 1 F Correction for SSB power RP-82 RP-182669 0565 1 F Correction on SBB release RP-82 RP-182669 0569 1 F Correction for SSB power RP-82 RP-182669 0569 1 F Correction for SSB power RP-82 RP-182669 0569 1 F Correction for SSB power RP-82 RP-182669 0569 1 F Correction for SSB power RP-82 RP-182669 0569 1 F Correction for SSB power RP-82 RP-182669 0569 1 F Correction for SPB power RP-82 RP-182669 0569 1 F Correction for SPB power RP-82 RP-182669 0569 1 F Correction for SPB power RP-82 RP-182669 0569 1 F Correction for SPB p	15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0
RP-82	15.4.0 15.4.0
RP-82	15.4.0 15.4.0
RP-82 RP-182663 0506 1 F Correction on the behaviors with cell reselection while T302 is running RP-82 RP-182666 0509 2 F Correction on SDAP reconfiguration handling RP-82 RP-182663 0510 1 F Clarification for the UE behaviour in camped normally and camped on any ce states RP-82 RP-182663 0514 2 F Correction to description of parameter Ns nAndPagingFrameOffset RP-82 RP-182664 0515 F Correction to description of parameter Ns RANdPagingFrameOffset RP-82 RP-182660 0516 1 F CR on UE behaviour after SI Acquisition Failure RP-82 RP-182662 0518 1 F CR on UE behaviour after SI Acquisition Failure RP-82 RP-182665 0520 1 F Clarifications on receiving RRCReject without wait timer RP-82 RP-182664 0520 1 F CR on powerControlOffset RP-82 RP-182660 0530 1 F CR on powerControlOffset RP-82 RP-182660 0530 1 F R on PCCH-Config RPCREPeix Without wait timer RP-82 RP-182660 0530 1 F R on PCCH-Config RPCREPeix Without wait timer RP-82 RP-182660 0530 1 F R on PCCH-Config RPCREPeix Without wait timer RP-82 RP-182660 0530 1 F R on PCCH-Config RPCREPeix Without wait timer RP-82 RP-182660 0530 1 F Correction to configuration of firstPDCCH-MonitoringOccasionOfPO RP-82 RP-182660 0530 1 F Correction to no barring configuration for implicit uAC RP-82 RP-182660 0543 2 F Per serving cell MIMO layer configuration RPCREPEIX RP-82 RP-182660 0550 1 F Correction to reconfiguration with sync RP-82 RP-182660 0550 1 F Correction for SSB power RP-82 RP-182660 0550 1 F Correction for SSB power RP-82 RP-182660 0560 1 F Correction on ShortMACI description in 38.331 RP-82 RP-182660 0560 1 F Correction on ShortMACI description in 38.331 RP-82 RP-182660 0560 1 F Correction on ShortMACI description in 38.331 RP-82 RP-182660 0570 1 F Avoiding security risk for RLC UM bearers during termination point change RP-82 RP-182660 0570 1 F Avoiding security risk for RLC UM bearers during termination point change RP-82 RP-182660 0570 1 F Correction of receiving to on ShortMaCI description in 38.331 RP-82 RP-182660 0570 1 F Avoiding security risk for RLC UM bearers during	15.4.0 15.4.0
RP-82 RP-182661 0509 2 F Correction on SDAP reconfiguration handling RP-82 RP-182663 0510 1 F Clarification for the UE behaviour in camped normally and camped on any ce states RP-82 RP-182663 0514 2 F Correction to description of parameter Ns nAndPagingFrameOffset RP-82 RP-182664 0515 - F Correction to description of parameter Ns RP-82 RP-182661 0516 1 F CR on UE behaviour after SI Acquisition Failure RP-82 RP-182662 0518 1 F CR on UE behaviour after SI Acquisition Failure RP-82 RP-182662 0520 1 F CR on UE CH-ConfigCommon RP-82 RP-182665 0522 1 F CR on powerControlOffset RP-82 RP-182664 0524 2 F Correction to configuration of firstPDCCH-MonitoringOccasionOfPO RP-82 RP-182664 0524 2 F Correction to configuration for Implicit UAC RP-82 RP-182664 0539 1 F R on PCCH-Config RP-82 RP-182664 0541 - F Clarification to no barring configuration for Implicit UAC RP-82 RP-182664 0542 - F Correction to Access Category and barring config determination for implicit access barring RP-82 RP-182664 0543 2 F Per serving cell MIMO layer configuration RP-82 RP-182666 0559 1 F Correction for SSB power RP-82 RP-182665 0552 1 F Correction for SSB power RP-82 RP-182665 0558 1 F Correction for TCI state in ControlResourceSet RP-82 RP-182665 0560 1 F Correction for TCI state in ControlResourceSet RP-82 RP-182665 0569 - F Correction on ShortMAC-I description in 38.331 RP-82 RP-182660 0567 1 F CR for the optional configuration of subbandSize RP-82 RP-182660 0570 - F Avoiding security risk for RLC UM bearers during termination point change RP-82 RP-182660 0571 1 F MO configuration with SSB SCS for a given SSB frequency RP-82 RP-182660 0571 1 F Cateffication of UE behaviour when frequencyBandList is absent in SIB4 RP-82 RP-182661 0578 2 F Handling of missing fields in SIB1 RP-82 RP-182660 0572 1 F Correction for TCI configuration for inter-RAT handover	15.4.0 15.4.0
RP-82 RP-182663 0510 1 F Clarification for the UE behaviour in camped normally and camped on any ce states RP-82 RP-182663 0514 2 F Correction to description of parameter Ns nAndPagingFrameOffset RP-82 RP-182664 0515 - F Correction to description of parameter Ns nAndPagingFrameOffset RP-82 RP-182664 0516 1 F Can or UE behaviour after SI Acquisition Failure RP-82 RP-182665 0518 1 F Can or UE behaviour after SI Acquisition Failure RP-82 RP-182662 0520 1 F Can or UE behaviour after SI Acquisition Failure RP-82 RP-182665 0522 1 F Can or UE behaviour after SI Acquisition Failure RP-82 RP-182666 0522 1 F Can or UE behaviour after SI Acquisition Failure RP-82 RP-182666 0522 1 F Can or UE behaviour after SI Acquisition Failure RP-82 RP-182666 0524 2 F Correction to configuration of firstPDCCH-MonitoringOccasionOfPO RP-82 RP-182660 0539 1 F Correction to configuration of firstPDCCH-MonitoringOccasionOfPO RP-82 RP-182660 0539 1 F Correction to no barring configuration for Implicit UAC RP-82 RP-182664 0541 - F Clarification to no barring configuration for Implicit UAC RP-82 RP-182664 0543 2 F Per serving cell MIMO layer configuration RP-82 RP-182666 0545 1 F Correction to reconfiguration with sync RP-82 RP-182665 0554 1 F Correction for SSB power RP-82 RP-182665 0554 1 F Correction for SSB power RP-82 RP-182665 0558 1 F Correction for SSB power RP-82 RP-182665 0558 1 F Correction for SSB power RP-82 RP-182665 0558 1 F Correction for SSB power RP-82 RP-182665 0550 0560 1 F CR for the optional configuration of subbandSize RP-82 RP-182665 0560 057 1 F CR to the field descriptions of System Information RP-82 RP-182660 0571 1 F Mo configuration with SSB SCS for a given SSB frequency RP-82 RP-182660 0571 1 F Mo configuration of SBB release RP-82 RP-182660 0571 1 F Mo configuration of UE behaviour when frequencyBandList is absent in SIB4 RP-82 RP-182661 0578 2 F Handling of missing fields in SIB1 RP-82 RP-182661 0578 2 F Handling of missing fields in SIB1 RP-82 RP-182667 0582 2 F Full configuration for	1 15.4.0
RP-82 RP-182663 0514 2 F Correction to description of parameter Ns nAndPagingFrameOffset	15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0
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RP-82	15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0 15.4.0
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RP-82 RP-182667 0582 2 F Full configuration for inter-RAT handover	15.4.0
	15.4.0
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		RP-190540	0811	1	F	Clarifying handling of parent and child IE need nodes	15.5.0
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		RP-190540	0905	-	F	Corrections to MFBI	15.5.0
		RP-190542	0912	1	F	CR on clarification on the description of NIA0	15.5.0
		RP-190542	0913	1	F	CR on the number of bits of downlink NAS COUNT value	15.5.0
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	RP-84	RP-191374	1069	<u> </u>	F	On CGI reporting contents	15.6.0
		RP-191374	1071	1-	F	CR for 38.331 on security related corrections to UE and Network initiated RRC	15.6.0
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		RP-191377	1092	1	F	Correction on Measurement Report Triggering for Periodical Report	15.6.0
		RP-191375	1094	Ŀ	F	Correction on PDCP duplication configuration	15.6.0
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RP-84 RP-191376 1100 1 F Correction on initial BWP configuration on NR UL and SUL RP-84 RP-191377 1101 1 F Correction on initial BWP configuration in DownlinkConfigCommon and UplinkConfigCommon and UplinkConfigConmon and UplinkConfigCommon and UplinkCo	15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-84 RP-191377 1101 1 F Correction on PUCCH cell RP-84 RP-191377 1103 1 F Correction on the pdcp-Config RP-84 RP-191379 1104 2 F Correction on the pdcp-Config RP-84 RP-191381 1106 2 F Correction on pathlossReferenceLinking RP-84 RP-191375 1110 - F Clarification of dedicated priority handling from RRC_INACTIVE to RRC_IDLI RP-84 RP-191375 1111 - F Clarification of dedicated priority handling from RRC_INACTIVE to RRC_IDLI RP-84 RP-191376 1113 - F Clarification of timing reference for CSI-RS resources RP-84 RP-191376 1113 - F Clarification of NAS triggered event RP-84 RP-191376 1115 - F UE capability on different numerologies within the same PUCCH RP-84 RP-191376 1115 - F UE capability on different numerologies within the same PUCCH RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-85 RP-192199 1120 1 C Additional capability of aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS' RP-85 RP-192191 1122 1 F Correction of TD-UL-DL-Config RP-85 RP-192191 1122 1 F Correction of the secondHopPRB Parameter RP-85 RP-192191 1124 1 F Correction of the secondHopPRB Parameter RP-85 RP-192191 1124 1 F Small Corrections for Inter-node Messages RP-85 RP-192191 1126 1 F Clarification on FailureInformation RP-85 RP-192191 1136 1 F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1138 1 F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1138 1 F Clarification on FailureInformation to upper layers during Full Configuration RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192191 1139 1 F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1139 1 F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1139 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1151 2 F PDU session release indication to upper layers during Full Configuration RP-85 RP-192192 1146	15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-84 RP-191377 1101 1 F Correction on PUCCH cell RP-84 RP-191377 1103 1 F Correction on DUCCH cell RP-84 RP-191379 1104 2 F Correction on pathlossReferenceLinking RP-84 RP-191379 1104 2 F Correction on pathlossReferenceLinking RP-84 RP-191379 1106 2 F Clarification of dedicated priority handling from RRC_INACTIVE to RRC_IDL RP-84 RP-191375 1110 - F Clarification on sending condition for mcg-RB-Config RP-84 RP-191376 1113 - F Clarification of timing reference for CSI-RS resources RP-84 RP-191376 1113 - F Setting of resumeCause for NAS triggered event RP-84 RP-191376 1115 - F UE capability signalling for FD-MIMO processing capabilities for EN-DC RP-84 RP-191376 1115 - F Modified UE capability on different numerologies within the same PUCCH group RP-84 RP-191889 1117 1 F Removal of "Capability for aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS" 09/2019 RP-85 RP-192196 1120 1 C Additional capability signalling for 1024QAM support RP-85 RP-192191 1122 1 F Correction on TDD-UL-DL-Config RP-85 RP-192191 1122 1 F Correction of TDD-UL-DL-Config RP-85 RP-192191 1123 - F RSRP reporting of SFTD measurement in NR-DC RP-85 RP-192191 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192190 1127 - F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192191 1138 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192191 1130 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1151 1 F Corrections to SRB2 and DRB configuration RP-85 RP-192191 1151 1 F Corrections to SRB2 and DRB configuration RP-85 RP-192191 1151 1 F Correction of SRB2 and DRB configuration RP-85 RP-192191 1151 1 F Correction of SRB2 and DRB configuration RP-85 RP-192191 1151 1 F Correction of Condition HO-toNR and HO-Conn RP-85 RP-192191 1151 1 F Correction of Fild description on UE-Capability RequestFilterCommon (58.33)	15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-84 RP-191379 1103 1 F Correction on the pdcp-Config RP-84 RP-191379 1104 2 F Correction on pathlossReferenceLinking RP-84 RP-191375 1110 - F Clarification of dedicated priority handling from RRC_INACTIVE to RRC_IDLI RP-84 RP-191375 1111 - F Clarification on sending condition for mcg-RB-Config RP-84 RP-191375 1111 - F Clarification of timing reference for CSI-RS resources RP-84 RP-191376 1111 - F Setting of resumeCause for NAS triggered event RP-84 RP-191376 1111 - F UE capability signalling for FD-MIMO processing capabilities for EN-DC RP-84 RP-191376 1115 - F Modified UE capability on different numerologies within the same PUCCH group RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-84 RP-191478 1116 1 C Additional capability for aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS' 09/2019 RP-85 RP-192191 1122 1 F Correction on TDD-UL-DL-Config RP-85 RP-192191 1122 1 F Correction on TDD-UL-DL-Config RP-85 RP-192191 1123 - F RSRP reporting of SFTD measurement in NR-DC RP-85 RP-192191 1124 1 F Small Corrections for System Information RP-85 RP-192191 1126 1 F Correction on Layer 3 Filtering for E-UTRA RP-85 RP-192191 1136 1 F Clarification on Layer 3 Filtering for E-UTRA RP-85 RP-192191 1136 1 F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1138 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1138 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1138 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192191 1151 2 F Corrections on SRB2 and DRB configuration RP-85 RP-192191 1151 2 F Correction on DRBC configuration RP-85 RP-192191 1151 2 F Correction on DRBC configuration RP-85 RP-192191 1151 1 F Correction on DRBC configuration RP-85 RP-192191 1151 2 F Correction on DRBC configuration RP-85 RP-192191 1151 1 F Correction on DRBC configuration RP-85 RP-192192 1167 1 F Correction on ORDC Configuration	15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-84 RP-191381 1104 2 F Correction on pathlossReferenceLinking RP-84 RP-191381 1106 2 F Clarification of declared priority handling from RRC_INACTIVE to RRC_IDLI RP-84 RP-191375 1110 - F Clarification on sending condition for mcg-RB-Config RP-84 RP-191375 1111 - F Clarification on sending condition for mcg-RB-Config RP-84 RP-191376 1113 - F Setting of resumeCause for NAS triggered event RP-84 RP-191376 1114 - F UE capability signalling for FD-MIMO processing capabilities for EN-DC RP-84 RP-191376 1115 - F Modified UE capability on different numerologies within the same PUCCH group RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-84 RP-191589 1117 1 F Removal of "Capability of aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS" 09/2019 RP-85 RP-192196 1120 1 C Additional capability signalling for 1024QAM support RP-85 RP-192191 1121 1 F Correction of the secondHopPRB Parameter RP-85 RP-192191 1122 1 F Correction of the secondHopPRB Parameter RP-85 RP-192191 1123 - F RSRP reporting of SFTD measurement in NR-DC RP-85 RP-192191 1125 - F Correction of the secondHopPRB Parameter RP-85 RP-192191 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192191 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192191 1136 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192191 1138 1 F Clarification of Dayer 3 Filtering for E-UTRA RP-85 RP-192191 1138 1 F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1138 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1138 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1151 2 F PDU session release indication to upper layers during Full Configuration RP-85 RP-192192 1161 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192192 1161 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192192 1161 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192192 1167 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192	15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-84 RP-191381 1106 2 F Clarification of dedicated priority handling from RRC_INACTIVE to RRC_IDLI RP-84 RP-191375 1110 - F Clarification on sending condition for mcg-RB-Config RP-84 RP-191376 1111 - F Clarification of timing reference for CSI-RS resources RP-84 RP-191376 1113 - F Setting of resumeCause for NAS triggered event RP-84 RP-191376 1114 - F UE capability signalling for FD-MIMO processing capabilities for EN-DC RP-84 RP-191376 1115 - F Modified UE capability on different numerologies within the same PUCCH group RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-85 RP-192199 1120 1 C Additional capability signalling for 1024QAM support RP-85 RP-192191 1121 1 F Correction on TDD-UL-D-Looffig RP-85 RP-192191 1122 1 F Correction on TDD-UL-D-Looffig RP-85 RP-192191 1122 1 F Correction on TDD-UL-D-Looffig RP-85 RP-192191 1124 1 F Small Corrections for System Information RP-85 RP-192191 1124 1 F Corrections for System Information RP-85 RP-192191 1126 1 F Clarification to flayer 3 Filtering for E-UTRA RP-85 RP-192191 1136 1 F Clarification to Inter-node Messages RP-85 RP-192191 1136 1 F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1136 1 F Clarification to Inter-node Messages RP-85 RP-192191 1136 1 F Clarification to Inter-node Messages RP-85 RP-192191 1136 1 F Clarification to Inter-node Messages RP-85 RP-192191 1138 1 F Clarification to SPTD measurement gaps for subframe and slot timing detection to March SPTD Measurement gaps for subframe and slot timing RP-85 RP-192191 1139 1 B Introduction of SPTD measurement to neighbour cells for NR SA RP-85 RP-192191 1139 1 B Introduction of SPTD measurement to neighbour cells for NR SA RP-85 RP-192191 1139 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1160 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192191 1161 1 F Clarification on Max payload of PUCCH-ResourceSet RP-85 RP-192192 1176	15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-84 RP-191375 1110 - F Clarification on sending condition for mcg-RB-Config RP-84 RP-191376 1111 - F Clarification of timing reference for CSI-RE resources RP-84 RP-191376 1113 - F Setting of resumeCause for NAS triggered event RP-84 RP-191376 1115 - F UE capability signalling for FD-MIMO processing capabilities for EN-DC RP-84 RP-191376 1115 - F UE capability signalling for FD-MIMO processing capabilities for EN-DC RP-84 RP-191478 1116 2 F UE capability on different numerologies within the same PUCCH group RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-84 RP-191589 1117 F Removal of "Capability for aperiodic CSI-RS" 09/2019 RP-85 RP-192196 1120 1 C Additional capability signalling for 1024QAM support RP-85 RP-192191 1121 1 F Correction of TDD-UL-DL-Config RP-85 RP-192190 1122 1 F Correction of the secondHopPRB Parameter RP-85 RP-192191 1124 1 F Small Corrections for System Information RP-85 RP-192191 1126 1 F Corrections for Inter-node Messages RP-85 RP-192191 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192190 1127 - F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192190 1137 - F Updates for positioning measurement gaps for subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1138 1 F Clarification of SITD measurement to neighbour cells for NR SA RP-85 RP-192191 1139 1 B Introduction of SRE2 and DRB configuration RP-85 RP-192191 1161 1 F Corrections on SRE2 and DRB configuration RP-85 RP-192191 1161 1 F Correction on max payload of PUCCH-ResourceSet RP-85 RP-192191 1161 1 F Correction on max payload of PUCCH-ResourceSet RP-85 RP-192191 1161 1 F Clarification on naver publication to upper layers during Full Configuration RP-85 RP-192191 1161 1 F Correction of condition HO-toNR and HO-Conn RP-85 RP-192192 1172 1 F Clarification on selectedBandCombination RP-85 RP-192192 1174 2 F Clarification on selectedBandCombination RP-85 RP-192192 1177 1 F Clarification on selectedBandCombination under publication to UE-CapabilityRequest	15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-84 RP-191375 1111 - F Clarification of timing reference for CSI-RS resources RP-84 RP-191376 1113 - F Setting of resumeCause for NAS triggered event RP-84 RP-191376 1114 - F UE capability signalling for FD-MIMO processing capabilities for EN-DC RP-84 RP-191376 1115 - F Modified UE capability signalling for FD-MIMO processing capabilities for EN-DC RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-84 RP-191589 1117 1 F Removal of "Capability for aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS" 09/2019 RP-85 RP-192196 1120 1 C Additional capability signalling for 1024QAM support RP-85 RP-192191 1121 1 F Correction on TDD-UL-DL-Config RP-85 RP-192191 1122 1 F Correction on TDD-UL-DL-Config RP-85 RP-192190 1123 - F RSRP reporting of SFTD measurement in NR-DC RP-85 RP-192191 1124 1 F Small Corrections for Inter-node Messages RP-85 RP-192191 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192191 1136 1 F Clarification on FailureInformation report for NE-DC RP-85 RP-192190 1137 - F Clarification on FailureInformation report for Subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1138 1 F Clarification for enabling of configured PUSCH frequency hopping RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192191 1144 1 F Corrections to 38.331 on SI-schedulingInfo RP-85 RP-192191 1161 1 F Clarification on max payload of PUC-H-ResourceSet RP-85 RP-192191 1161 1 F Clarification on PUSCH configuration RP-85 RP-192191 1161 1 F Clarification on PUSCH configuration RP-85 RP-192191 1161 1 F Clarification on PUSCH configuration RP-85 RP-192192 1167 1 F Clarification on selectedBandCombination RP-85 RP-192192 1177 1 F Clarification on selectedBandCombination RP-85 RP-192192 1177 1 F Clarification on selectedBandCombination RP-85 RP-192192 1177 1 F Clarifying bandling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRe	15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-84 RP-191376 1113 - F Setting of resumeCause for NAS triggered event RP-84 RP-191376 1114 - F UE capability signalling for FD-MIMO processing capabilities for EN-DC RP-84 RP-191376 1115 - F Modified UE capability on different numerologies within the same PUCCH group RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-84 RP-191589 1117 1 F Removal of "Capability for aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS" 09/2019 RP-85 RP-192196 1120 1 C Additional capability signalling for 1024QAM support RP-85 RP-192191 1121 1 F Correction on TDD-UL-DL-Config RP-85 RP-192191 1122 1 F Correction of the secondHopPRB Parameter RP-85 RP-192190 1123 - F RSRP reporting of SFTD measurement in NR-DC RP-85 RP-192191 1124 1 F Small Corrections for System Information RP-85 RP-192191 1125 - F Corrections for Inter-node Messages RP-85 RP-192191 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192190 1127 - F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1136 1 F Clarification to fullConfig in NR RP-85 RP-192191 1137 - F Updates for positioning measurement gaps for subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192191 1130 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1150 1 F Corrections to 38.331 on SI-schedulinglinfo RP-85 RP-192191 1160 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192191 1160 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192191 1161 1 F Clarification on selectedBandCombination RP-85 RP-192191 1174 1 F Clarification on selectedBandCombination RP-85 RP-192191 1174 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33	15.6.0 15.6.0 15.6.0 15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-84 RP-191376 1114 - F UE capability signalling for FD-MIMO processing capabilities for EN-DC RP-84 RP-191376 1115 - F Modified UE capability on different numerologies within the same PUCCH group RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-84 RP-191589 1117 1 F Removal of "Capability for aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS triggering with different numerologies and consulting triggering with different numerologies within the same PUCCH and CSI-RS triggering with different numerologies within the same PUCCH and CSI-RS triggering with different numerologies within the same PUCCH and CSI-RS triggering with different numerologies within the same PUCCH and CSI-RS triggering with different numerologies within the same PUCCH and CSI-RS triggering with different numerologies within the same PUCCH and CSI-RS triggering with different numerologies within the same PUCCH and CSI-RS triggering with different numerologies within the same PUCCH and CSI-RS triggering with different numerologies within the same PUCCH and CSI-RS triggering with different numerologies with and cSI-RS triggering with different numerologies with different numerolog	15.6.0 15.6.0 15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-84 RP-191476 1115 - F Modified UE capability on different numerologies within the same PUCCH group RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-84 RP-191589 1117 1 F Removal of "Capability for aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS" 09/2019 RP-85 RP-192196 1120 1 C Additional capability signalling for 1024QAM support RP-85 RP-192191 1121 1 F Correction on TDD-UL-DL-Config RP-85 RP-192190 1122 1 F Correction on TDD-UL-DL-Config RP-85 RP-192190 1123 - F RSRP reporting of SFTD measurement in NR-DC RP-85 RP-192191 1124 1 F Small Corrections for System Information RP-85 RP-192194 1125 - F Corrections for Inter-node Messages RP-85 RP-192191 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192190 1127 - F Clarification to FailureInformation report for NE-DC RP-85 RP-192190 1137 - F Updates for positioning measurement gaps for subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1138 1 F Clarification for enabling of configured PUSCH frequency hopping RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192193 1148 2 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1151 2 F PDU session release indication to upper layers during Full Configuration RP-85 RP-192191 1160 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192192 1170 1 F Clarification on PUSCH configuration RP-85 RP-192192 1160 1 F Clarification on PUSCH configuration RP-85 RP-192192 1170 1 F Clarification on PUSCH configuration RP-85 RP-192192 1170 1 F Clarification on PUSCH configuration RP-85 RP-192192 1171 1 F Clarification on Selected Band Combination RP-85 RP-192192 1177 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192192 1177 1 F Clarifying Handling of information elements on the F1 interface RP-85 RP-192192 1177 1 F Clarifying handling of information elements on the F1 interface	15.6.0 15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-84 RP-191589 1117 1 F Removal of "Capability for aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS" 09/2019 RP-85 RP-192196 1120 1 C Additional capability signalling for 1024QAM support RP-85 RP-192191 1122 1 F Correction on TDD-UL-DL-Config RP-85 RP-192191 1122 1 F Correction of the secondHopPRB Parameter RP-85 RP-192190 1123 - F RSRP reporting of SFTD measurement in NR-DC RP-85 RP-192191 1124 1 F Small Corrections for System Information RP-85 RP-192191 1126 1 F Corrections for Inter-node Messages RP-85 RP-192191 1126 1 F Clarification on Layer 3 Filtering for E-UTRA RP-85 RP-192190 1127 - F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1136 1 F Clarification to fullConfig in NR RP-85 RP-192190 1137 - F Updates for positioning measurement gaps for subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1138 1 F Clarification for enabling of configured PUSCH frequency hopping RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192192 1144 1 F Corrections to 38.331 on SI-schedulingInfo RP-85 RP-192191 1151 2 F PDU session release indication to upper layers during Full Configuration RP-85 RP-192191 1160 1 F Clarification on PUSCH configuration RP-85 RP-192191 1160 1 F Clarification on PUSCH configuration RP-85 RP-192192 1167 1 F Correction of Condition HO-toNR and HO-Conn RP-85 RP-192192 1167 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192192 1177 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192192 1177 1 F Clarifying Handling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33	15.6.0 15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-84 RP-191478 1116 2 F Clarification to commonSearchSpaceList in PDCCH-ConfigCommon RP-84 RP-191589 1117 1 F Removal of "Capability for aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS triggering with different numerology between PDCCH and CSI-RS" 09/2019 RP-85 RP-192196 1120 1 C Additional capability signalling for 1024QAM support RP-85 RP-192191 1122 1 F Correction on TDD-UL-DL-Config RP-85 RP-192191 1122 1 F Correction on TDD-UL-DL-Config RP-85 RP-192191 1123 1 F Correction of the secondHopPRB Parameter RP-85 RP-192191 1124 1 F Small Corrections for System Information RP-85 RP-192191 1125 - F Corrections for System Information RP-85 RP-192191 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192191 1126 1 F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1136 1 F Clarification on FailureInformation report for NE-DC RP-85 RP-192190 1137 - F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1138 1 F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1138 1 F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1139 1 B Introduction of SFTD measurement gaps for subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192191 1144 1 F Corrections to 38.331 on SI-schedulingInfo RP-85 RP-192191 1161 1 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1161 1 F Clarification on PUSCH configuration RP-85 RP-192191 1161 1 F Clarification on PUSCH configuration RP-85 RP-192191 1161 1 F Clarification on PUSCH configuration RP-85 RP-192192 1177 1 F Clarification on PUSCH configuration to upper layers during Full Configuration RP-85 RP-192192 1177 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192192 1178 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192192 1178 1 F Clarifying UE capability freqHopping	15.6.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
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numerology between PDCCH and CSI-RS"	15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-85 RP-192196 1120 1 C Additional capability signalling for 1024QAM support	15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-85 RP-192191 1121 1 F Correction on TDD-UL-DL-Config RP-85 RP-192191 1122 1 F Correction of the secondHopPRB Parameter RP-85 RP-192190 1123 - F RSRP reporting of SFTD measurement in NR-DC RP-85 RP-192191 1124 1 F Small Corrections for System Information RP-85 RP-192194 1125 - F Corrections for Inter-node Messages RP-85 RP-192191 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192190 1127 - F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1136 1 F Clarification to fullConfig in NR RP-85 RP-192191 1137 - F Updates for positioning measurement gaps for subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1138 1 F Clarification for enabling of configured PUSCH frequency hopping RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192192 1144 1 F Corrections to 38.331 on SI-schedulingInfo RP-85 RP-192191 1151 2 F PDU session release indication to upper layers during Full Configuration RP-85 RP-192191 1160 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192192 1167 1 F Correction of condition HO-toNR and HO-Conn RP-85 RP-192192 1172 1 F Clarification on selectedBandCombination RP-85 RP-192193 1174 2 F Clarifying bandling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33	15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
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RP-85 RP-192190 1123 - F RSRP reporting of SFTD measurement in NR-DC RP-85 RP-192191 1124 1 F Small Corrections for System Information RP-85 RP-192194 1125 - F Corrections for Inter-node Messages RP-85 RP-192190 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192190 1127 - F Clarification of FailureInformation report for NE-DC RP-85 RP-192191 1136 1 F Clarification to fullConfig in NR RP-85 RP-192190 1137 - F Updates for positioning measurement gaps for subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1138 1 F Clarification for enabling of configured PUSCH frequency hopping RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192192 1144 1 F Corrections to 38.331 on SI-schedulingInfo RP-85 RP-192193 1148 2 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1150 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192191 1160 1 F Clarification on PUSCH configuration RP-85 RP-192192 1167 1 F Correction of condition HO-toNR and HO-Conn RP-85 RP-192190 1173 1 F Clarification on selectedBandCombination RP-85 RP-192191 1174 2 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192192 1177 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192192 1177 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192192 1177 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192192 1177 1 F Clarifying Handling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33	15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-85 RP-192191 1124 1 F Small Corrections for System Information RP-85 RP-192194 1125 - F Corrections for Inter-node Messages RP-85 RP-192191 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192190 1127 - F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1136 1 F Clarification to fullConfig in NR RP-85 RP-192190 1137 - F Updates for positioning measurement gaps for subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1138 1 F Clarification for enabling of configured PUSCH frequency hopping RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192192 1144 1 F Corrections to 38.331 on SI-schedulingInfo RP-85 RP-192193 1148 2 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1151 2 F PDU session release indication to upper layers during Full Configuration RP-85 RP-192191 1160 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192192 1167 1 F Correction of Condition HO-toNR and HO-Conn RP-85 RP-192190 1173 1 F Clarification on selectedBandCombination RP-85 RP-192190 1173 1 F Clarification on selectedBandCombination RP-85 RP-192193 1174 2 F Clarification on selectedBandCombination RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33	15.7.0 15.7.0 15.7.0 15.7.0 15.7.0
RP-85 RP-192194 1125 - F Corrections for Inter-node Messages RP-85 RP-192191 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192190 1127 - F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1136 1 F Clarification to fullConfig in NR RP-85 RP-192190 1137 - F Updates for positioning measurement gaps for subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1138 1 F Clarification for enabling of configured PUSCH frequency hopping RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192192 1144 1 F Corrections to 38.331 on SI-schedulingInfo RP-85 RP-192193 1148 2 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1151 2 F PDU session release indication to upper layers during Full Configuration RP-85 RP-192191 1160 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192192 1167 1 F Correction of Condition HO-toNR and HO-Conn RP-85 RP-192190 1173 1 F Clarification on selectedBandCombination RP-85 RP-192193 1174 2 F Clarification on selectedBandCombination RP-85 RP-192193 1174 2 F Clarification on field descriptions in UE-CapabilityRequestFilterCommon (38.33	15.7.0 15.7.0 15.7.0 15.7.0
RP-85 RP-192191 1126 1 F Clarification of Layer 3 Filtering for E-UTRA RP-85 RP-192190 1127 - F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1136 1 F Clarification to fullConfig in NR RP-85 RP-192190 1137 - F Updates for positioning measurement gaps for subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1138 1 F Clarification for enabling of configured PUSCH frequency hopping RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192192 1144 1 F Corrections to 38.331 on SI-schedulingInfo RP-85 RP-192193 1148 2 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1151 2 F PDU session release indication to upper layers during Full Configuration RP-85 RP-192191 1160 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192192 1167 1 F Clarification on PUSCH configuration RP-85 RP-192192 1167 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192193 1174 2 F Clarifying handling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33	15.7.0 15.7.0 15.7.0 15.7.0
RP-85 RP-192190 1127 - F Clarification on FailureInformation report for NE-DC RP-85 RP-192191 1136 1 F Clarification to fullConfig in NR RP-85 RP-192190 1137 - F Updates for positioning measurement gaps for subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1138 1 F Clarification for enabling of configured PUSCH frequency hopping RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192192 1144 1 F Corrections to 38.331 on SI-schedulingInfo RP-85 RP-192193 1148 2 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1151 2 F PDU session release indication to upper layers during Full Configuration RP-85 RP-192191 1160 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192192 1167 1 F Clarification on PUSCH configuration RP-85 RP-192192 1167 1 F Correction of condition HO-toNR and HO-Conn RP-85 RP-192192 1172 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192193 1174 2 F Clarifying handling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33)	15.7.0 15.7.0 15.7.0
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RP-85 RP-192190 1137 - F Updates for positioning measurement gaps for subframe and slot timing detection towards E-UTRA RP-85 RP-192191 1138 1 F Clarification for enabling of configured PUSCH frequency hopping RP-85 RP-192191 1139 1 B Introduction of SFTD measurement to neighbour cells for NR SA RP-85 RP-192192 1144 1 F Corrections to 38.331 on SI-schedulingInfo RP-85 RP-192193 1148 2 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1151 2 F PDU session release indication to upper layers during Full Configuration RP-85 RP-192191 1160 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192191 1161 1 F Clarification on PUSCH configuration RP-85 RP-192192 1167 1 F Correction of condition HO-toNR and HO-Conn RP-85 RP-192192 1172 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192193 1174 2 F Clarifying handling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33)	15.7.0 15.7.0
detection towards E-UTRA	15.7.0
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RP-85 RP-192193 1148 2 F Clarification on SRB2 and DRB configuration RP-85 RP-192191 1151 2 F PDU session release indication to upper layers during Full Configuration RP-85 RP-192191 1160 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192191 1161 1 F Clarification on PUSCH configuration RP-85 RP-192192 1167 1 F Correction of condition HO-toNR and HO-Conn RP-85 RP-192192 1172 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192190 1173 1 F Clarification on selectedBandCombination RP-85 RP-192193 1174 2 F Clarifying handling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33)	15.7.0
RP-85 RP-192191 1151 2 F PDU session release indication to upper layers during Full Configuration RP-85 RP-192191 1160 1 F Clarification on max payload of PUCCH-ResourceSet RP-85 RP-192191 1161 1 F Clarification on PUSCH configuration RP-85 RP-192192 1167 1 F Correction of condition HO-toNR and HO-Conn RP-85 RP-192192 1172 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192190 1173 1 F Clarification on selectedBandCombination RP-85 RP-192193 1174 2 F Clarifying handling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33)	15.7.0
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RP-85 RP-192192 1167 1 F Correction of condition HO-toNR and HO-Conn RP-85 RP-192192 1172 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192190 1173 1 F Clarification on selectedBandCombination RP-85 RP-192193 1174 2 F Clarifying handling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33)	15.7.0
RP-85 RP-192192 1172 1 F Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4 RP-85 RP-192190 1173 1 F Clarification on selectedBandCombination RP-85 RP-192193 1174 2 F Clarifying handling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33)	15.7.0
RP-85 RP-192190 1173 1 F Clarification on selectedBandCombination RP-85 RP-192193 1174 2 F Clarifying handling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33)	15.7.0
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RP-85 RP-192193 1174 2 F Clarifying handling of information elements on the F1 interface RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33	15.7.0
RP-85 RP-192192 1178 1 F Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.33	15.7.0
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RP-85 RP-192190 1179 - F Clarification of ca-ParametersNR-forDC (38.331)	15.7.0
RP-85 RP-192193 1183 2 F Correction on reestablishRLC	15.7.0
RP-85 RP-192191 1185 1 F Correction on SFTD measurement configuration	15.7.0
RP-85 RP-192193 1191 2 F Handling of embedded RRC message in RRCReconfiguration procedure	15.7.0
RP-85 RP-192192 1201 2 F Clarification on definition of PUSCH-Less SCell	15.7.0
RP-85 RP-192190 1204 - F Correction on non-critical extension for NRDC-Parameters	15.7.0
RP-85 RP-192191 1208 1 F Correction on UE actions upon going to RRC_IDLE	15.7.0
RP-85 RP-192192 1211 1 F Correction on the acquisition of MIB and SIB1 for re-establishment	15.7.0
RP-85 RP-192192 1212 1 F Correction on band selection in SIB1	15.7.0
RP-85 RP-192193 1213 2 F Correction on the actions uption reception of SIB2 and SIB4	15.7.0
RP-85 RP-192193 1219 3 F Miscellaneous non-controversial corrections Set III	15.7.0
RP-85 RP-192194 1220 3 F Channel Bandwidth validation upon SIB1 acquisition	15.7.0
RP-85 RP-192193 1224 1 F Correction of presence conditions for common PSCell parameters	15.7.0
RP-85 RP-192190 1226 - F Release of unnecessary power restrictions upon RRC connection re-	15.7.0
establishment in NE-DC and NR-DC	1.5.7.0
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		RP-192934 RP-192934	1273	1	F	CR to introduce timer for DRX based SFTD measurement	15.8.0
		RP-192934 RP-192934	1274 1278	1	F	Correction on absence of gapPurpose Correction on field description of cellReselectionInfoCommon	15.8.0 15.8.0
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		RP-192934	1296	2	F	Correction on frequency indication in SIB1 and SIB2	15.8.0
		RP-192937	1300	2	F	Handling of AS-Config in HandoverPreparationInformation	15.8.0
		RP-192936	1301	2	F	Corrections on scg-RB-Config in CG-Config	15.8.0
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		RP-192937	1308	2	F	Correction of SRB3 handling at full configuration (Alt2)	15.8.0
		RP-192936 RP-192938	1309 1323	3	F	Correction to integrity protection in DRB addition and modification Miscellaneous non-controversial corrections Set IV	15.8.0 15.8.0
		RP-192935	1325	2	F	Presence and absence of TAC in NR cell	15.8.0
	RP-86	RP-192935	1332	4	F	Security Algorithms for Radio Bearers	15.8.0
		RP-192934	1333	1	F	Correction on the Msg3 based on demand system information	15.8.0
		RP-192935	1335	2	F	Clarification for aggregated bandwidth for overheating	15.8.0
	RP-86	RP-192935	1337	1	F	Clarification on the feature set report in EUTRAN	15.8.0
		RP-192934	1341	1	F	CR to 38.331 on CGI information	15.8.0
		RP-192936	1357	1	F	Restoring SDAP and RoHC contexts during Resumption	15.8.0
	RP-86	RP-192934	1358	-	F	Conditional presence on ue-CapabilityInfo and servCellIndexRangeSCG for inter-MN handover without SN change	15.8.0
	RP-86	RP-192934	1362	 	F	Configuration limitation for RRCRelease message in R15	15.8.0
		RP-192937	1368	1	F	Correction to AS security key update	15.8.0
		RP-192936	1369	1	F	Correction on the condition of RBTermChange	15.8.0
		RP-192936	1375	1	F	Correction on the configuration of split SRB	15.8.0
	RP-86	RP-192934	1378	-	F	Correction on camping conditions	15.8.0
	RP-86	RP-192937	1379	1	F	Correction on CORESET location	15.8.0
		RP-192938	1381	2	F	Correction to key derivation for the UE configured with sk-counter	15.8.0
		RP-192936	1383	1	F	Correction on the pre-condition for reconfiguration with sync of SCG	15.8.0
		RP-192935	1385	-	F	Correction on AS-Config	15.8.0
		RP-192935	1387	-	F	Correction on measurement reporting in NR-DC	15.8.0
		RP-192936 RP-192937	1389 1402	1	F	Correction on SIB1 description Correction to Feature Set Combination and Band combination list for NR-DC	15.8.0 15.8.0
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	RP-86	RP-192937	1403	2	F	Security requirements for split PDU session (38.331)	15.8.0
		RP-192938	1405	2	F	Correction of UE assistance information	15.8.0
		RP-192936	1406	1	F	Clarification regarding inter-node transfer of UE capability containers	15.8.0
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03/2020		RP-200335	1272	3	F	Corrections on maxMeasIdentitiesSCG-NR in MR-DC	15.9.0
		RP-200334	1409	2	F	CR on BWCS for inter-ENDC BC with intra-ENDC BC (38.331)	15.9.0
		RP-200334 RP-200335	1410 1440	2	F	CR to 38.331 on support of 70MHz channel bandwidth Clarification on the PLMN-IdentityInfoList	15.9.0 15.9.0
		RP-200333	1444	1	F	Correction on removal of NR-DC and NE-DC band combinations when	15.9.0
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	RP-87	RP-200334	1450	1	F	Correction on reporting of uplink TX direct current	15.9.0
		RP-200334	1454	1	F	Corrections to the Location measurement indication procedure	15.9.0
		RP-200334	1455	-	F	Introduction of provisions for late non-critical extensions	15.9.0
		RP-200334	1460	1	F	Correction on p-maxNR-FR1 for NE-DC	15.9.0
		RP-200334	1461	-	F	Correction on SFTD frequency list in INM	15.9.0
		RP-200335	1472	2	F	Miscellaneous non-controversial corrections Set V	15.9.0
		RP-200335 RP-200335	1475 1483	2	F	Capability coordination for NE-DC CR on fallback BC reporting	15.9.0 15.9.0
		RP-200333	1484	1	F	CR on overheating assistance reporting in handover case	15.9.0
		RP-200334	1496	1	F	Correction on NZP-CSI-RS-ResourceSet	15.9.0
		RP-200335	1501	1	F	UE capability of intra-band requirements for inter-band EN-DC/NE-DC	15.9.0
03/2020		RP-200335	1141	2	F	Correction on usage of access category 2 for UAC for RNA update	16.0.0
-		RP-200358	1149	2	F	NAS handling error of nas-Container for security key derivation	16.0.0
		RP-200356	1152	3	F	CR on capability of maxUplinkDutyCycle for inter-band EN-DC PC2 UE	16.0.0
		RP-200357	1168	3	F	Support of releasing UL configuration	16.0.0
		RP-200357	1218	3	В	Introduction of a second SMTC per frequency carrier in idle/inactive	16.0.0
		RP-200358 RP-200358	1312 1354	2	C C	Introduction of voice fallback indication CR to 38.331 on CSI-RS inter-node message	16.0.0 16.0.0
		RP-200358	1361	1	В	PRACH prioritization parameters for MPS and MCS	16.0.0
		RP-200358	1433	2	В	Introduction of downgraded configuration for SRS antenna switching	16.0.0
 		RP-200355	1434	2	В	Introduction of downgraded configuration for Srs affering switching	16.0.0
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		RP-200351	1441	1	В	Introduction of UECapabilityInformation segmentation in TS38.331	16.0.0

	RP-87	RP-200350	1446	1	В	Introduction of SRVCC from 5G to 3G	16.0.0
		RP-200350	1446	2	В	Introduction of SRVCC from 5G to 3G Introduction of on-demand SI procedure in RRC_CONNECTED	16.0.0
		RP-200358	1465	1	В	Introduction of DL RRC segmentation	16.0.0
		RP-200353	1468	1	В	Introducing the support of Non-Public Networks	16.0.0
	RP-87	RP-200344	1469	3	В	CR for 38.331 for Power Savings	16.0.0
		RP-200349	1471	4	В	38.331 CR on Integrated Access and Backhaul for NR	16.0.0
		RP-200348	1476	3	В	CR for 38.331 for CA&DC enh	16.0.0
ļ		RP-200341	1477	2	В	Introduction of NR operation with Shared Spectrum Access in RRC	16.0.0
		RP-200347	1478	2	В	Introduction of NR mobility enhancement	16.0.0
		RP-200335 RP-200343	1486	-	В	Introduction of additional RACH configurations for TDD FR1 Introduction of NR eURLLC	16.0.0
		RP-200343 RP-200354	1487 1488	2	B B	CR for introducing MDT and SON	16.0.0 16.0.0
		RP-200354	1489	_	С	CR to 38.331 on DRX coordination	16.0.0
		RP-200346	1493	1	В	Introduction of 5G V2X with NR sidelink	16.0.0
		RP-200340	1494	2	В	Introduction of CLI handling and RIM in TS38.331	16.0.0
		RP-200352	1498	1	В	Introduction of NR IIoT	16.0.0
		RP-200342	1499	1	В	Introduction of 2-step RA	16.0.0
		RP-200339	1500	2	В	Introduction of MIMO enhancements	16.0.0
		RP-200359	1502	-	В	Recommended Bit Rate/Query for FLUS and MTSI	16.0.0
		RP-200345	1504	2	В	Introduction of NR positioning	16.0.0
07/0000		RP-200358	1505		В	Support of inter-RAT handover from NR to EN-DC in TS 38.331	16.0.0
07/2020		RP-201191	1290	4	С	Missing reportAddNeighMeas in periodic measurement reporting	16.1.0
		RP-201166	1453	6	В	Introduction of NeedForGap capability for NR measurement	16.1.0
		RP-201185	1464	5	B F	Introduction of signalling for high-speed train scenarios Corrections to PRACH prioritization procedure for MPS and MCS	16.1.0
		RP-201191 RP-201182	1506 1513	2	F	Finalization of the support of Non-Public Networks	16.1.0 16.1.0
		RP-201182 RP-201172	1513	4	F	Miscellaneous corrections for NR-U	16.1.0
		RP-201174	1540	2	С	CR for 38.331 for Power Savings	16.1.0
		RP-201180	1553	3	F	Correction to transfer of UE capabilities at HO for RACS and minor ASN.1	16.1.0
				Ĺ	L	correction (38.331)	
		RP-201161	1556	2	Α	Clarification on avoiding keystream repeat due to COUNT reuse	16.1.0
		RP-201178	1557	2	F	CR for 38.331 on CA/DC Enhancements	16.1.0
		RP-201160	1560	2	Α	SRS Capability report for SRS only Scell	16.1.0
		RP-201160	1562	1	Α	Correction to RequestedCapabilityCommon	16.1.0
		RP-201187	1563	2	Α	CR on introduction of BCS to asymmetric channel bandwidths (38.331)	16.1.0
		RP-201159	1568	2	A F	Correction on PUCCH configuration	16.1.0
		RP-201176 RP-201160	1569 1572	2	A	Miscellaneous corrections to 38.331 for V2X Correction on the need for reconfiguration with sync in (NG)EN-DC, NR-DC	16.1.0 16.1.0
	111 -00	100	1372	_	^	and NE-DC	10.1.0
	RP-88	RP-201160	1579	1	Α	38331 CR(R16) on inter-RAT SFTD measurements	16.1.0
		RP-201160	1587	1	Α	Clarification on pdcp-Duplication at RRC Reconfiguration	16.1.0
		RP-201188	1588	3	F	Correction to RRC spec for eURLLC	16.1.0
	RP-88	RP-201179	1590	4	В	Corrections to 38.331 for supporting IAB in NPN	16.1.0
		RP-201177	1591	2	F	Corrections on NR mobility enhancements	16.1.0
		RP-201175	1592	2		Introduction of RRC Positioning	16.1.0
		RP-201166	1596	1	F	Band combination list for NE-DC (Cat-F)	16.1.0
		RP-201159	1599	-	Α	Avoiding security risk for RLC AM bearers during termination point change	16.1.0
		RP-201161	1602	1	Α	CR on SRS-CarrierSwitching	16.1.0
		RP-201164 RP-201165	1603 1614	1	A	CR on introduction of extended capabilities for NR-DC only BCs Clarification on the presence of ssb-perRACH-Occasion for the CSI-RS based	16.1.0 16.1.0
	1715-00	172-501100	1014		^	CFRA	10.1.0
	RP-88	RP-201163	1624	1	Α	Clarification on the maxPUSCH-Duration for LCP Restriction	16.1.0
		RP-201159	1631	<u> -</u>	Α	Clarification for SIB6, SIB7 and SIB8 acquisition during a measurement gap	16.1.0
	RP-88	RP-201198	1632	2	С	Introduction of secondary DRX group CR 38.331	16.1.0
		RP-201164	1634	1	Α	Correction to CORESET and PDCCH TCI state release	16.1.0
1					_		16 1 0
	RP-88	RP-201181	1641	-	F	Correction of NR IIoT	16.1.0
	RP-88 RP-88	RP-201162	1644	- 1	Α	Clarification on release and addition of the uplink for SCell	16.1.0
	RP-88 RP-88	RP-201162 RP-201189	1644 1645	- 1 -	A F	Clarification on release and addition of the uplink for SCell CR on 38.331 for SRVCC from 5G to 3G	16.1.0 16.1.0
	RP-88 RP-88 RP-88	RP-201162 RP-201189 RP-201159	1644 1645 1649	- 1 - -	A F A	Clarification on release and addition of the uplink for SCell CR on 38.331 for SRVCC from 5G to 3G Ambiguity in fr1-fr2-Add-UE-NR-Capabilities parameter	16.1.0 16.1.0 16.1.0
	RP-88 RP-88 RP-88 RP-88	RP-201162 RP-201189 RP-201159 RP-201162	1644 1645 1649 1656	- 1 - - 1	A F A	Clarification on release and addition of the uplink for SCell CR on 38.331 for SRVCC from 5G to 3G Ambiguity in fr1-fr2-Add-UE-NR-Capabilities parameter Correction to measurement coordination in MR-DC	16.1.0 16.1.0 16.1.0 16.1.0
	RP-88 RP-88 RP-88 RP-88 RP-88	RP-201162 RP-201189 RP-201159 RP-201162 RP-201176	1644 1645 1649 1656 1657	- - 1 1	A F A A	Clarification on release and addition of the uplink for SCell CR on 38.331 for SRVCC from 5G to 3G Ambiguity in fr1-fr2-Add-UE-NR-Capabilities parameter Correction to measurement coordination in MR-DC Introduction of on-demand SIB(s) procedure in CONNECTED	16.1.0 16.1.0 16.1.0 16.1.0 16.1.0
	RP-88 RP-88 RP-88 RP-88 RP-88 RP-88	RP-201162 RP-201189 RP-201159 RP-201162 RP-201176 RP-201164	1644 1645 1649 1656 1657 1662	- 1 1	A F A A F	Clarification on release and addition of the uplink for SCell CR on 38.331 for SRVCC from 5G to 3G Ambiguity in fr1-fr2-Add-UE-NR-Capabilities parameter Correction to measurement coordination in MR-DC Introduction of on-demand SIB(s) procedure in CONNECTED T310 handling during MobilityFromNR	16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0
	RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88	RP-201162 RP-201189 RP-201159 RP-201162 RP-201176 RP-201164 RP-201173	1644 1645 1649 1656 1657 1662 1664	- 1 1 1 2	A F A F A	Clarification on release and addition of the uplink for SCell CR on 38.331 for SRVCC from 5G to 3G Ambiguity in fr1-fr2-Add-UE-NR-Capabilities parameter Correction to measurement coordination in MR-DC Introduction of on-demand SIB(s) procedure in CONNECTED T310 handling during MobilityFromNR Corrections for 2-step Random Access Type	16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0
	RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88	RP-201162 RP-201189 RP-201159 RP-201162 RP-201176 RP-201164 RP-201173 RP-201216	1644 1645 1649 1656 1657 1662 1664 1665	- 1 1	A F A F A F B	Clarification on release and addition of the uplink for SCell CR on 38.331 for SRVCC from 5G to 3G Ambiguity in fr1-fr2-Add-UE-NR-Capabilities parameter Correction to measurement coordination in MR-DC Introduction of on-demand SIB(s) procedure in CONNECTED T310 handling during MobilityFromNR Corrections for 2-step Random Access Type Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2	16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0
	RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88	RP-201162 RP-201189 RP-201159 RP-201162 RP-201176 RP-201164 RP-201173 RP-201216 RP-201191	1644 1645 1649 1656 1657 1662 1664 1665 1666	- 1 1 1 2 2	A F A F A F B	Clarification on release and addition of the uplink for SCell CR on 38.331 for SRVCC from 5G to 3G Ambiguity in fr1-fr2-Add-UE-NR-Capabilities parameter Correction to measurement coordination in MR-DC Introduction of on-demand SIB(s) procedure in CONNECTED T310 handling during MobilityFromNR Corrections for 2-step Random Access Type Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2 Miscellaneous ASN.1 review corrections	16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0
	RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88	RP-201162 RP-201189 RP-201159 RP-201162 RP-201176 RP-201164 RP-201173 RP-201216 RP-201191 RP-201166	1644 1645 1649 1656 1657 1662 1664 1665 1666	- 1 1 1 2	A F A F A F B	Clarification on release and addition of the uplink for SCell CR on 38.331 for SRVCC from 5G to 3G Ambiguity in fr1-fr2-Add-UE-NR-Capabilities parameter Correction to measurement coordination in MR-DC Introduction of on-demand SIB(s) procedure in CONNECTED T310 handling during MobilityFromNR Corrections for 2-step Random Access Type Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2 Miscellaneous ASN.1 review corrections Miscellaneous non-controversial corrections Set V	16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0
	RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88	RP-201162 RP-201189 RP-201159 RP-201162 RP-201176 RP-201164 RP-201173 RP-201216 RP-201191 RP-201166 RP-201184	1644 1645 1649 1656 1657 1662 1664 1665 1666	- 1 1 1 2 2 1	A F A F A F B F	Clarification on release and addition of the uplink for SCell CR on 38.331 for SRVCC from 5G to 3G Ambiguity in fr1-fr2-Add-UE-NR-Capabilities parameter Correction to measurement coordination in MR-DC Introduction of on-demand SIB(s) procedure in CONNECTED T310 handling during MobilityFromNR Corrections for 2-step Random Access Type Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2 Miscellaneous ASN.1 review corrections	16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0
	RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88	RP-201162 RP-201189 RP-201159 RP-201162 RP-201176 RP-201164 RP-201173 RP-201216 RP-201191 RP-201166	1644 1645 1649 1656 1657 1662 1664 1665 1666 1668	- 1 1 1 2 2 1	A F A F B F	Clarification on release and addition of the uplink for SCell CR on 38.331 for SRVCC from 5G to 3G Ambiguity in fr1-fr2-Add-UE-NR-Capabilities parameter Correction to measurement coordination in MR-DC Introduction of on-demand SIB(s) procedure in CONNECTED T310 handling during MobilityFromNR Corrections for 2-step Random Access Type Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2 Miscellaneous ASN.1 review corrections Miscellaneous non-controversial corrections Set V Corrections on MDT and SON in NR	16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0
	RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88 RP-88	RP-201162 RP-201189 RP-201159 RP-201162 RP-201176 RP-201164 RP-201173 RP-201216 RP-201191 RP-201166 RP-201184 RP-201190	1644 1645 1649 1656 1657 1662 1664 1665 1666 1668 1669 1670	- 1 1 1 2 2 1 2 3	A F A F F F C	Clarification on release and addition of the uplink for SCell CR on 38.331 for SRVCC from 5G to 3G Ambiguity in fr1-fr2-Add-UE-NR-Capabilities parameter Correction to measurement coordination in MR-DC Introduction of on-demand SIB(s) procedure in CONNECTED T310 handling during MobilityFromNR Corrections for 2-step Random Access Type Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2 Miscellaneous ASN.1 review corrections Miscellaneous non-controversial corrections Set V Corrections on MDT and SON in NR Introduction of eCall over IMS for NR	16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0 16.1.0

RP-88	RP-201161	1683	1	Α	UE Capability Enhancement for FR1(TDD/FDD) / FR2 CA and DC	16.1.0
RP-88	RP-201164	1687	1	Α	Correction to re-sending UEAssistanceInformation upon reconfiguration w/	16.1.0
					sync	
RP-88	RP-201170	1696	4	F	eMIMO corrections	16.1.0
RP-88	RP-201166	1697	-	F	Corrections to SIB1 Processing	16.1.0
RP-88	RP-201171	1700	-	F	Corrections for CLI	16.1.0
RP-88	RP-201191	1703	1	F	Correction on MN-SN measurements coordination in INM	16.1.0
RP-88	RP-201163	1707	-	Α	SMTC Configuration for PSCell Addition for NR-DC (Option 2)	16.1.0
RP-88	RP-201165	1711	1	Α	Introduction of CGI reporting capabilities	16.1.0
RP-88	RP-201191	1716	-	В	Aperiodic CSI-RS triggering with beam switching timing of 224 and 336	16.1.0
RP-88	RP-201166	1717	1	В	Implementing confirmation of code block group based transmission	16.1.0
RP-88	RP-201179	1718	1	F	Correction to TS 38.331 for IAB WI	16.1.0
RP-88	RP-201183	1719	-	В	RRC configuration of supporting UL Tx switching	16.1.0
RP-88	RP-201183	1720	-	В	UE capability of supporting UL Tx switching	16.1.0

09/2020		RP-201929	1533	3	F	CLI configuration	16.2.0
	RP-89	RP-201922	1737	2	F	Corrections to failure type for MCGFailureInformation and	16.2.0
						SCGFailureInformation	
		RP-201937	1746	1	Α	Clarification on CG-ConfigInfo for NR-DC and NE-DC	16.2.0
		RP-201963	1747	1	F	Miscellaneous corrections for NR IIoT	16.2.0
		RP-201937	1749	1	Α	CR on SyncAndCellAdd condition	16.2.0
		RP-201937	1751	1	A	CR to clarify UE behaviour after TAT expiry due to reconfigurationWithSync	16.2.0
		RP-201930 RP-201986	1755 1756	2	F B	Handling of CPC in fast MCG recovery Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2	16.2.0 16.2.0
		RP-201989	1757	1	F	Minor corrections and update for RRC Positioning	16.2.0
		RP-201938	1764	1	F	Correction on the Cross Carrier Scheduling Configuration	16.2.0
		RP-201922	1768	2	F	Correction on the Configuration of sCellState for 38.331	16.2.0
		RP-201930	1771	1-	F	Minor Correction for Mobility Further Enhancement	16.2.0
		RP-201989	1779	-	F	Corrections to acquisition of posSIB(s) in RRC_CONNECTED	16.2.0
		RP-201989	1781	1	F	Corrections to handing posSIB-MappingInfo in SIB1	16.2.0
	RP-89	RP-201938	1787	1	F	SMTC Configuration for PSCell Addition and SN Change in NR-DC	16.2.0
		RP-201923	1794	1	F	Corrections of RLF cause Signalling procedure	16.2.0
	RP-89	RP-201937	1800	1	Α	CR on the BandCombination (R16)	16.2.0
	RP-89	RP-201922	1803	1	F	Adding enableDefaultBeamForCCS for cross-carrier scheduling with different SCS	16.2.0
	RP-89	RP-201927	1810	1	F	Correction on cross-RAT V2X functionality in TS 38.331	16.2.0
		RP-201930	1818	-	F	Time misalignment in DAPS DRB configuration (Alt.2)	16.2.0
		RP-201927	1820	2	F	Miscellaneous correction regarding on demand SIB in CONNECTED	16.2.0
		RP-201927	1821	2	F	Redundant procedural text of on demand SIB in CONNECTED	16.2.0
		RP-201922	1823	-	F	Correction to field condition on refFR2ServCellAsyncCA	16.2.0
		RP-201930	1836	-	F	Corrections to Conditional Reconfiguration triggering	16.2.0
		RP-201921	1844	3	F	RRC clarficiations for NR-U	16.2.0
		RP-201930	1845	1	F	Clarification on TS38.331 for DAPS	16.2.0
		RP-201930	1847	-	F	T312 handling during Mobility from NR	16.2.0
		RP-201930	1850	2	F	Corretion on the RLF for NR DAPS	16.2.0
		RP-201932	1852	1	F	Correction on beamSwitchTiming values of 224 and 336	16.2.0
		RP-201930	1861	-	F	RLF in source cell during DAPS handover	16.2.0
		RP-201929	1862	2	F	Misc. corrections CR for 38.331 for Power Savings	16.2.0
		RP-201920	1863	3	F	Miscellaneous eMIMO corrections	16.2.0
		RP-201922	1864	1	F	Missing fields for Toffset coordination in INM	16.2.0
		RP-201922	1865	1	F	Misc corrections for Rel-16 DCCA	16.2.0
		RP-201930	1866	-	F	Correction of field description for Mobility Enhancments	16.2.0
		RP-201930 RP-201932	1868	1	F	Correction of description of CHO events for Mobility Enhancments	16.2.0
		RP-201932	1869 1870	1	F	ASN.1 corrections to maintain backwards compatibility Remaining ASN.1 review issues	16.2.0 16.2.0
		RP-201920	1872	1	A	Miscellaneous non-controversial corrections Set VII	16.2.0
		RP-201936	1873	1	В	Introduction of MPE reporting	16.2.0
		RP-201930	1874	<u> </u>	F	Corrections to Mobility Enahncements	16.2.0
		RP-201937	1878	-	A	Clarification on scg-RB-Config	16.2.0
		RP-201922	1879	1	F	Correction on storing SCG configuration in UE INACTIVE AS context	16.2.0
		RP-201930	1886	<u> -</u>	F	Timer handling upon initiation of RRC re-establishment	16.2.0
		RP-201930	1888	 -	F	No support of DAPS HO for a CHO candidate cell	16.2.0
		RP-201930	1898	1-	F	Correction on TS38.331 for CHO	16.2.0
		RP-201938	1908	1	Α	Correction on UE assistance information transmission for handover case	16.2.0
		RP-201931	1911	2	F	Correction on the UE Capability presence upon SN addition and SN change	16.2.0
		RP-201928	1924	1	F	Correction on msgA-PUSCH-Config	16.2.0
		RP-201989	1925	1	F	Introduction of PRS measurement gap	16.2.0
	RP-89	RP-201927	1930	1	F	Miscellaneous corrections on TS 38.331	16.2.0
		RP-201930	1936	Ŀ	F	Correction on NR CHO	16.2.0
		RP-201929	1937	1	F	Miscellaneous RRC corrections for NR eURLLC	16.2.0
		RP-201932	1948	1	F	Correction on HO from NR to EN-DC	16.2.0
		RP-201923	1952	1	F	Corrections on F1-C transfer path	16.2.0
		RP-201923	1954	<u> - </u>	F	Corrections on default BH RLC channel	16.2.0
		RP-201923	1955	1	F	Correction on the value range of BH-LogicalChannelIdentity-Ext	16.2.0
		RP-201923	1956	<u> -</u>	F	Correction on cellReservedForOperatorUse	16.2.0
		RP-201923	1957	1	F	Correction on SearchSpace configuration for IAB	16.2.0
		RP-201923	1958	<u> </u>	F	Corrections on the IAB-MT TDD resource configuration	16.2.0
		RP-201932	1961	4	В	CR for Early Implementation in NR	16.2.0
		RP-201932	1969	1	F	CR on UE behavior with E-UTRA cell selection upon mobility from NR failure for enhanced EPS voice fallback	16.2.0
	RP-89	RP-201930	1974	1	F	CR on drb-ContinueROHC for DAPS	16.2.0
	RP-89	RP-201921	1976	2	F	Miscellaneous corrections for NR-U	16.2.0
		RP-201937	1979	1	Α	Reconfiguring RoHC and setting the drb-ContinueROHC simultaneously	16.2.0
	111 03						
		RP-201938	1986	1	Α	Clarification on the SRB configuration for fullConfig during RRC Resume procedure	16.2.0

	RP-89	RP-201927	1991	2	F	CR to 38.331 on SLSS ID	16.2.0
		RP-201927	1992	1	F	Correction on RRC parameters for 5G V2X with NR sidelink	16.2.0
		RP-201922	1993	-	F	Correction on HARQ ACK spatial bundling configurations for secondary PUCCH group	16.2.0
	RP-89	RP-201924	1994	1	F	Update to IAB-MT capabilities	16.2.0
		RP-201927	1995	-	F	Adding notes for joint success and failure in crossRAT SL	16.2.0
	RP-89	RP-201927	1997	-	F	Corrections on RAN1 related clarifications	16.2.0
	RP-89	RP-201931	1998	-	D	Editorial corrections on MDT and SON in NR	16.2.0
	RP-89	RP-201931	1999	-	F	Correction to MDT features	16.2.0
		RP-201931	2000	-	F	Correction to SON features	16.2.0
		RP-201928	2001	-	F	Corrections for NPNs	16.2.0
		RP-201927	2002	-	F	Clarification on UL and SL priority thresholds	16.2.0
		RP-201924	2003	-	F	Miscellaneous IAB Corrections	16.2.0
		RP-201962	2007	1	F	Miscellaneous corrections on UL Tx switching	16.2.0
		RP-201925	2008	-	В	Configuration for uplink power boosting via suspended IBE requirements	16.2.0
		RP-201922 RP-201927	2009	-	F	NR-DC UE capabilities Correction on the calculation of CG occasion	16.2.0 16.2.0
12/2020		RP-201927	1775	2	F	NR CA additional spectrum emission requirements	16.2.0
12/2020		RP-202777	2017	-	В	Configuration for directional collision handling between reference cell and other cell for half-duplex operation in CA	16.3.0
	RP-90	RP-202773	2021	1	F	Clarification on referenceTimePreferenceReporting in RRC Reconfiguration Procedure	16.3.0
	RP-90	RP-202790	2029	 	F	Correction on UAI during handover	16.3.0
		RP-202771	2038	1	F	Correction to PDSCH TDRA for DCI 1-2	16.3.0
		RP-202789	2040	1	Α	Correction for configuration of SRS Carrier Switching	16.3.0
		RP-202767	2042	1	F	Correction to NR-U Energy Detection Threshold configuration	16.3.0
		RP-202778	2051	1	В	Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2	16.3.0
	RP-90	RP-202767	2052	-	F	Correction of field description for ra-ResponseWindow	16.3.0
	RP-90	RP-202767	2055	-	F	Clarification on HARQ process sharing for CGs	16.3.0
	RP-90	RP-202790	2059	1	Α	Corrections on the configurations of HARQ-ACK spatial bundling and CBG in 38.331	16.3.0
		RP-202774	2061	1	F	Clarification on no support of CA, DC or multi-TRP with DAPS	16.3.0
		RP-202790	2064	1	Α	Corrections on PDCP duplication capability for NR-DC	16.3.0
		RP-202790	2066	1	F	Clarification on SIB mapping to SI message	16.3.0
		RP-202776	2075	1	F	UE assistance information for DRX preference	16.3.0
		RP-202767	2091	1	F	Miscellaneous corrections for NR-U	16.3.0
		RP-202768	2107	2	F	UE behaviour when UL 7.5KHz shift is not supported	16.3.0
		RP-202772	2122	1	F	Correction on non-DRB for IAB-MT Corrections on BH RLC channel	16.3.0
		RP-202772	2124	1	F	Corrections on RLF cause determination	16.3.0 16.3.0
		RP-202772 RP-202790	2125 2130	1	F	Correction on uac-AccessCategory1-SelectionAssistanceInfo	16.3.0
		RP-202790	2134	2	F	Miscellaneous non-controversial corrections Set VIII	16.3.0
		RP-202775	2142	2	F	Correction on field description of	16.3.0
	111 30	10 202773	2172	_		configuredGrantConfigType2DeactivationStateList	10.5.0
	RP-90	RP-202776	2145	1	F	Correction on RRC state preference	16.3.0
	RP-90	RP-202789	2146	1	F	Clarifications for the common search space on the active BWP	16.3.0
		RP-202771	2149	1	F	Corrections to 2-Step RA	16.3.0
	RP-90	RP-202777	2151	_	F	Discarding of stored DL RRC message segments when UE transitions to RRC_IDLE	16.3.0
		RP-202771	2159	-	F	Correction on BFD resource on SCell	16.3.0
		RP-202770	2161	2	F	Misc corrections for Rel-16 DCCA	16.3.0
		RP-202770	2163	<u> -</u>	F	Missing fields for Toffset coordination	16.3.0
		RP-202770	2166	1	F	Processing delay requirements for DLInformationTransferMRDC	16.3.0
<u> </u>		RP-202773	2175	1	F	Correction regarding reconfigure EHC	16.3.0
		RP-202770	2178	-	C	Processing delay requirements for RRC resume	16.3.0
		RP-202770	2180	1	F	Correction for fast MCG link recovery in (NG)EN-DC	16.3.0
		RP-202771 RP-202771	2181 2182	2	F	Correction on HARQ ACK/NACK feedback configuration	16.3.0 16.3.0
		RP-202771 RP-202772	2184	1	F	Correction on slot based repetition RRC Miscellaneous Corrections	16.3.0
		RP-202772	2192	1	F	Support of Rel-16 features for SCG in EN-DC and NR-DC	16.3.0
			2198	1	F	Correction on acquisition of MIB and SIB1	16.3.0
		RP-202775	2199	 -	F	Correction on posSIB broadcastStatus	16.3.0
		RP-202776	2215	<u> </u>	F	Clarification on SRVCC handover	16.3.0
		RP-202769	2230	1	F	Miscellaneous corrections on TS 38.331	16.3.0
		RP-202771	2250	1	С	38331 CR for CSI-RS-ResourceConfigMobility	16.3.0
		RP-202775	2254	Ŀ	F	Correction on T321 for autonomous gap based CGI in FR2	16.3.0
	RP-90	RP-202772	2265	-	F	Transmission suspension on BH RLC channel upon IAB-MT failure	16.3.0
		RP-202790	2273	3	Α	CR on TS 38.331 for LCP restriction of configured grant type 1	16.3.0
		RP-202769	2274		F	Correction on RRC parameters for NR SL communication	16.3.0
	RP-90	RP-202771	2276	3	F	Introduction of capability bit for multi-CC simultaneous TCI activation with	16.3.0
		<u> </u>		<u> </u>	<u> </u>	multi-TRP	

	RP-90	RP-202771	2277	1	F	Selecting index for PLMN, SNPN and UAC parameters	16.3.0
		RP-202775	2278	<u>'</u>	F	Positioning RRC updates for posSIB validity check and field description	16.3.0
	111 -30	101 -202113	2210		•	correction	10.5.0
	RP-90	RP-202774	2280	-	F	Miscellaneous corrections for conditional reconfiguration	16.3.0
		RP-202774	2282	-	F	Miscellaneous corrections for DAPS (NR)	16.3.0
		RP-202773	2284	1	F	Corrections for PDCP duplication introduced in IIoT	16.3.0
		RP-202769	2285	-	F	Corrections on sidelink related RRC procedures	16.3.0
		RP-202770	2287	-	Α	Dummify UE capability of crossCarrierScheduling-OtherSCS	16.3.0
		RP-202776	2293	-	F	RRC corrections on NR SON and MDT	16.3.0
	RP-90	RP-202770	2294	-	F	CR for Unaligned CA signalling in TS 38.331	16.3.0
	RP-90	RP-202767	2295	-	F	Name change of the UE capability for the extended RAR window monitoring	16.3.0
	RP-90	RP-202884	2297	-	Α	CR to 38.331 on handling of fallbacks for FR2 CA	16.3.0
01/2021	RP-90					Corrected the extension marker in type PosSchedulingInfo-r16 so that it	16.3.1
						passes ASN.1 syntax check	
03/2021		RP-210693	2034	3	F	Corrections to acquisition of positioning SIBs	16.4.0
		RP-210702	2036	3	Α	Clarification to usage of ConfigRestrictModReqSCG	16.4.0
		RP-210695	2147	1	F	Clarification for aperiodic CSI and secondary DRX group	16.4.0
		RP-210701	2237	1	Α	Clarification on P-max in FrequencyInfoUL in FR2	16.4.0
		RP-210690	2298	1	F	Correction on the Handling of Reconfiguration within RRC Resume	16.4.0
		RP-210690	2300	1	F	Clarification on Fast MCG Link Recovery	16.4.0
		RP-210692	2301	1	F	CR on co-configuration of Rel-16 features	16.4.0
		RP-210689	2302	2	F	Correction on reset configuration	16.4.0
		RP-210689	2303	1	F	Clarification on the inter-frequency operation	16.4.0
		RP-210694	2306	1	F	Correction on RSSI and channel occupancy measurements	16.4.0
		RP-210689	2315	1	F	Correction on value range of sl-ConfigIndexCG and sl-HARQ-ProcID-offset	16.4.0
		RP-210693	2317	1	F	Clarficiations on the required posSIB	16.4.0
		RP-210697	2321	1	F	UE capability of NR to UTRA-FDD CELL_DCH CS handover	16.4.0
		RP-210693	2322	-	F	Corrections on posSIB validity	16.4.0
		RP-210694	2325	1	F	CR on 38.331 for power saving	16.4.0
		RP-210701	2333	-	A	CR on SyncAndCellAdd condition	16.4.0
		RP-210693	2341	1	F	RA report and Logged MDT Info extendibility	16.4.0
		RP-210692	2346	1	F	Support of NUL and SUL during DAPS handover	16.4.0
		RP-210694	2360	-	F F	Clarification on NR-U RSSI measurement procedure	16.4.0
		RP-210703	2371	2	В	Correction to measResultServingMOList impacting EN-DC	16.4.0 16.4.0
		RP-210695 RP-210692	2377 2379		F	Inter-node messaging for supporting intra-band EN-DC scenarios Dummifying intraFreqMultiUL-TransmissionDAPS-r16 capability	
		RP-210692	2384	-	F	HARQ-ACK codebook configuration for secondary PUCCH group	16.4.0 16.4.0
		RP-210690	2385	1	F	Misc corrections for Rel-16 DCCA	16.4.0
		RP-210694	2387	<u>'</u>	F	RRC corrections for NR-U	16.4.0
		RP-210689	2391	3	F	Correction on SL configured grant type 1 validity under Uu RLF	16.4.0
		RP-210692	2392	2	F	Inability to comply with conditional reconfiguration	16.4.0
		RP-210691	2398	2	F	Miscellaneous corrections on IAB in 38.331	16.4.0
		RP-210703	2400	1	F	Miscellaneous non-controversial corrections Set IX	16.4.0
		RP-210695	2401	1	F	Correction on complete message at handover from NR to EN-DC	16.4.0
		RP-210703	2402	1	F	Release with Redirect for connection resume triggered by NAS	16.4.0
		RP-210691	2404	<u> </u>	F	Correction on the configuration of Type 1 configured grant	16.4.0
		RP-210703	2405	1	F	NR RRC processing time with segmentation	16.4.0
		RP-210691	2407	1	F	Introduction of UE Capability and Configuration for SpCell BFR Enhancement	16.4.0
		RP-210695	2414	2	F	ASN.1 guidelines for extension of lists using ToAddMod structure	16.4.0
		RP-210692	2417	2	F	Corrections for DAPS Handover	16.4.0
		RP-210689	2418	1	F	CR on measurement object modification	16.4.0
		RP-210692	2419	1	F	Clarification on ULInformationTransferMRDC message	16.4.0
		RP-210690	2422	1	F	Clarification on sCellState configuration upon SCell modification	16.4.0
		RP-210691	2427	1	F	Corrections on BAP address and default BAP configuration	16.4.0
		RP-210691	2428	2	F	Corrections on the default configuration with Need M	16.4.0
		RP-210693	2429	1	F	Corrections on NR MDT and SON	16.4.0
		RP-210693	2433	1	F	Clarification for SIBs scheduled in posSchedulingInfoList	16.4.0
		RP-210690	2436	2	F	Correction on tci-PresentInDCI	16.4.0
		RP-210689	2437	1	F	Miscellaneous corrections on TS 38.331	16.4.0
		RP-210689	2440	2	F	Correction on C-RNTI replacement and conditions for 2-step RA	16.4.0
		RP-210689	2445	1	F	Stop conditions of T320 in NR protocols	16.4.0
	RP-91	RP-210697	2447	1	F	CR on the Capability of PUCCH Transmissions for HARQ-ACK-38331	16.4.0
	RP-91	RP-210694	2448	1	F	UTRA capabilities forwarding in handover preparation	16.4.0
		RP-210693	2449	1	F	Correction on SI window calculation for PosSIB	16.4.0
	RP-91	RP-210692	2450	-	F	[Post112-e][254][R16 MOB] Clarification of behaviour to avoid security risk in	16.4.0
						CHO based recovery after handover without key change failure	1
		RP-210693	2457	<u> -</u>	F	Miscl corrections on SON and MDT	16.4.0
		RP-210689	2458	<u> -</u>	F	Correction to 38.331 on intra-frequency reselection	16.4.0
1	IRP-91	RP-210689	2460	1	F	T400 expiry in timer table and protection of RRC messages	16.4.0
		DD 6					
	RP-91	RP-210692 RP-210690	2461 2462	-	F F	Correction on NR Mobility Enhancement CR on serving cell reporting	16.4.0 16.4.0

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		RP-210697	2463	-	F	Capability for dormant BWP switching of multiple SCells	16.4.0
		RP-210695	2466 2467	-	F	Correction to PUSCH skipping with UCI without LCH-based prioritization Corrections on NR MDT and SON	16.4.0
		RP-210693 RP-210692	2467	1	F		16.4.0 16.4.0
		RP-210692 RP-210702	2469	-	А	Correction on inter-node signalling for DAPS UE capability coordination Dummy the capability bit v2x-EUTRA	16.4.0
		RP-210630	2470	1	В	Release-16 UE capabilities based on updated RAN1 and RAN4 feature lists	16.4.0
		RP-210693	2471	-	В	Uplink Tx DC location reporting for two carrier uplink CA	16.4.0
	RP-91	111 210000	2-77		_	MCC: replaced all "-v16xy" with "-v1640"	16.4.1
06/2021		RP-211487	2413	6	С	Redirection with MPS Indication [Redirect_MPS_I]	16.5.0
		RP-211474	2475	3	F	Corrections to the UE action upon SIB1 reception	16.5.0
		RP-211470	2477	1	F	Correction on parameters of SL configured grant	16.5.0
		RP-211474	2490	2	F	Corrections on the descriptions of SRS-Config	16.5.0
		RP-211475	2494	2	F	Correction on T321 for autonomous gap based CGI reporting in LTE	16.5.0
	RP-92	RP-211482	2496	2	Α	CR on RRC processing delay	16.5.0
		RP-211475	2502	1	F	CR on the configuration restriction on DCI format 0_2/1_2 for unlicensed band	16.5.0
						(Option 1)	
	RP-92	RP-211475	2505	2	F	Correction on description of ssb-PositionsInBurst in	16.5.0
						ServingCellConfigCommonSIB	
		RP-211475	2508	1	F	Correction on freqMonitorLocations	16.5.0
		RP-211486	2516	3	A	Clean-up of INM procedure text	16.5.0
		RP-211485	2519	3	F	Miscellaneous non-controversial corrections Set X	16.5.0
		RP-211485	2527	3	Α	Clarification on SCellIndex and servCellIndex	16.5.0
		RP-211484	2531	2	A	Correction on firstActiveDownlinkBWP-Id	16.5.0
		RP-211471	2534	3	F	Misc corrections for Rel-16 DCCA	16.5.0
	KP-92	RP-211483	2540	2	F	Correction on failureType in FailureReportSCG-EUTRA and scgFailureInfoEUTRA	16.5.0
	DD 02	RP-211471	2543	2	F	Clarification on NR SCG configuration within RRC Resume	16.5.0
		RP-211484	2550	3	A	Clarification on SCS of active DL and UL BWP	16.5.0
		RP-211470	2551	3	F	Miscellaneous corrections on TS 38.331 for NR V2X	16.5.0
		RP-211470	2552	3	F	Corrections on TS 38.331 from the latest RAN1 decisions	16.5.0
		RP-211485	2556	2	Α	Clarification on RLC bearer handling in full configuration	16.5.0
		RP-211472	2557	2	F	Miscellaenous corrections on BH RLC channel management for IAB-MT	16.5.0
		RP-211475	2561	3	F	Correction on description of subCarrierSpacing in BWP	16.5.0
		RP-211470	2562	2	F	Correction on releasing referenceTimePreferenceReporting and sl-	16.5.0
						AssistanceConfigNR	
	RP-92	RP-211484	2564	3	Α	Correction on T325	16.5.0
	RP-92	RP-211473	2565	2	F	Full configuration for CHO	16.5.0
	RP-92	RP-211485	2567	2	Α	Abortion of RRC connection resume handling	16.5.0
	RP-92	RP-211470	2569	1	F	Transmission of UEAssistanceInformation or SidelinkUEInformationNR after	16.5.0
						conditional handover	
		RP-211483	2572	1	Α	Clarification on SCellFrequencies	16.5.0
	RP-92	RP-211474	2574	1	F	Correction for the positioning SI offset and clarification on mapping of posSIB	16.5.0
	DD 00	DD 044404	0570		_	to SI	10.5.0
			2579		F	UL Config Grant capability differentiation for FR1(TDD/FDD) / FR2	16.5.0
	RP-92	RP-211474	2580	2	Г	Corrections on the UE capability of indication on supporting the extension of SRSresourceID	16.5.0
	DD 02	DD 211/02	2581	1	F	Clarification on the initiation of RNA update	16.5.0
		RP-211483 RP-211478	2585	3	В	Release-16 UE capabilities based on RAN1 and RAN4 feature lists	16.5.0
		RP-211470	2586	-	F	Correction on repetition for L1-SINR	16.5.0
		RP-211472	2590	 	F	Correction on reportSlotOffsetList	16.5.0
		RP-211473	2598	1	F	Clarification on the Timing Reference of PSCell SMTC Configuration	16.5.0
		RP-211478	2599	1	F	Introduction of the intra-NR and inter-RAT HST Capabilities and Configuration	16.5.0
		RP-211475	2600	<u> -</u>	F	SSB-ToMeasure for NR-U	16.5.0
		RP-211482	2602	1 -	A	Clarification on CGI reporting	16.5.0
		RP-211471	2605	1	F	Miscellaneous Corrections to the SNPN	16.5.0
		RP-211474	2609	1-	С	Adding 400 Mhz and 600 MHz frequency separation classes	16.5.0
		RP-211482	2615	-	Α	Correction on CrossCarrierSchedulingConfig Introduced by Two PUCCH	16.5.0
					L	Group	
	RP-92	RP-211473	2616	1	F	38.331 Correction on Failure Recovery via CHO for Inter-RAT Handover	16.5.0
				<u> </u>		Failure	ļ.,
		RP-211472	2619	1	F	Miscellaneous corrections on IAB	16.5.0
		RP-211471	2626	<u> -</u>	F	Correction on RNA configuration for UE in SNPN access mode	16.5.0
		RP-211470	2636	2	F	Correction of Sidelink Configured Grant Type 1 Usage During Handover	16.5.0
	KP-92	RP-211483	2639	[-	Α	Introduction of DL scheduling slot offset capabilities in	16.5.0
	DD 00	DD 044474	2644	2	E	UERadioPagingInformation	16 5 0
		RP-211474 RP-211470	2644	2	F	Clarifications on the TRP definition for positioning	16.5.0
-			2647	1	F	Configuration of search spaces for scheduling SL transmissions Correction on description of msg1-SubcarrierSpacing in RACH-	16.5.0
	KF-92	RP-211475	2652	'	Г	ConfigCommon	16.5.0
	RP-92	RP-211485	2667	1	Α	Correction on flow remapping to an added DRB	16.5.0
-		RP-211483	2675	L	Α	Clarification on the frequency deprioritisation	16.5.0
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RP-92 RP-211486 5866 1 A Correction on A-CSI trigger state configuration RP-92 RP-21147 2896 F CR	PD-02	DD-211/86	2686	1	Α	Correction on A-CSI trigger state configuration	16.5.0
RP-92 RP-211471 886 F CR on CGI reporting for NPN-Only cell RP-92 RP-211473 2700 F Clarification on non-coexistence of CHO and DAPS				_	_	RLC and PDCP Re-establishment upon RRC resume/reestablishment	16.5.0
RP-92 RP-211478 2699 A Correction to ca-ParametersNR-ForDC				<u> -</u>			16.5.0
RP-92 RP-211473 2700 F Clarification on non-coexistence of CHO and DAPS RP-92 RP-211471 2703 C NR-DC Cell Group capability filtering RP-92 RP-211471 2705 A C RP-92 RP-211471 2705 A C RP-92 RP-211471 2705 A C RP-92 RP-211471 2706 F SON-MDT Changes agreed in RANZ#114 meeting RP-93 RP-212442 2708 F C Correction on U Skipping for PUSCH in Reh-16 RP-93 RP-212442 2708 F C Correction on U Skipping for PUSCH in Reh-16 RP-93 RP-212442 2709 F C Correction on U Skipping for PUSCH in Reh-16 RP-93 RP-212442 2714 F E Early implementation of ocal over IMS in NR RP-93 RP-212442 2715 F Miscellaneous corrections on TS 38.331 RP-93 RP-212442 2725 T F Miscellaneous corrections on TS 38.331 RP-93 RP-212442 2725 T F Correction to inter-frequency cell reselection for MIB, SIB1 acquisition failure and TAC absence in SIB1 RP-93 RP-212442 2725 T F Correction to description of pD-AlphaSets RP-93 RP-212442 2726 T F Modification of meastd for conditional reconfiguration RP-93 RP-212442 2726 T F Modification of meastd for conditional reconfiguration RP-93 RP-212442 2760 F Correction to description of pD-AlphaSets RP-93 RP-212442 2760 F Correction to 38.331 on the field description of magA-TransMax RP-93 RP-212442 2760 F Correction to 38.331 on the field description of magA-TransMax RP-93 RP-212443 2776 T F Correction on RRC reconfiguration for fast MCG link recovery RP-93 RP-212443 2776 F Correction on RRC reconfiguration for fast MCG link recovery RP-93 RP-212443 2776 F Correction on RRC reconfiguration for fast MCG link recovery RP-93 RP-212443 2776 F Correction on RRC processing on fine for the second PA RP-93 RP-212433 2789 F Correction on RRC processing legly for HO from E-UTRA to NR RP-93 RP-212433 2789 F Correction on Reset in Second PA RP-93 RP-212433 2789 F Correction on the RRC processing legly for HO f				-	_		16.5.0
RP-92 RP-211471 2703 C NR-DC Cell Group capability filtering RP-92 RP-211471 2706 F SON-MDT Changes agreed in RAN2#114 meeting				-	F		16.5.0
RP-92 RP-211478 2705 F CR on the Fallback Band Combination Removing-R16				-	F		16.5.0
RP-92 RP-214471 2706 F SON-MDT Changes agreed in RAN2#114 meeting	RP-92	RP-211471		2	С		16.5.0
Georgia RP-93 RP-212444 2709 F Correction to IU. Skipping for PUSCH in Rel-16 RP-93 RP-212444 2719 F Corrections to IS Building for PMP only cell RP-93 RP-212444 2714 F Early implementation of Call over IMS in NR RP-93 RP-212442 2715 F RP-93 RP-212442 2716 F F Miscellaneus corrections on TS 38.331 RP-912442 2728 F Correction to Intra-frequency cell reselection for MIB, SIB1 acquisition failure and TAC absence in SIB1 RP-93 RP-212442 2728 F Correction to description of the Dishabasts RP-93 RP-212442 2729 F Correction to Section on TCI configuration for DCI format 1, 2 Correction to Section on TCI configuration for DCI format 1, 2 Correction to Section on Tell Phyladests RP-93 RP-212442 2750 F Correction to Section on the NIPN-Identifyriolust RP-93 RP-212442 2760 F Correction to Resid for conditional reconfiguration RP-93 RP-212442 2760 F Correction to Resid for conditional reconfiguration RP-93 RP-212442 2776 F Corrections on RRC reconfiguration for magA-TransMax RP-93 RP-212442 2776 F Corrections on RRC reconfiguration for magA-TransMax RP-93 RP-212443 2776 F Corrections on RRC reconfiguration for fiss MIMO RP-93 RP-212439 2786 F Correction on RRC processing deligible for HO from E-UTRA to NR RP-93 RP-212439 2786 F Correction on Indiback band combination for SUL RP-93 RP-212439 2799 Z A Correction on RRC processing deligibly for HO from E-UTRA to NR RP-93 RP-212442 2801 F Corrections to pack handward for the second PA RP-93 RP-212442 2801 F Corrections to pack handward RP-93 RP-212442 2801 F Corrections to pack handward RP-93 RP-212442 2801 F Corrections to pack handward RP-93 RP-212442 2801 F Correction on Reconfiguration (URL PR) RP-93 RP-212442 2801 F Correction on Reconfiguration (URL PR) RP-93 RP-212442 2801 F Correction on Correcting National Processing Processing R				-			16.5.0
RP-93 RP-212442 2779 1 F Corrections to SIB validity for NPN only cell				-			16.5.0
RP-93 RP-212444 2714 . F. Early implementation of sCall over IMS in NR RP-93 RP-212441 2715 . F. Miscellaneous corrections on 173.93.31 . RP-93 RP-212442 2726 . F. Correction to intra-frequency cell reselection for MIB, SIB1 acquisition failure and TAC absence in SIB1 . RP-93 RP-212442 2728 . I. F. Correction to description of pCA-planSets . RP-93 RP-212442 2728 . I. F. Correction to description of pCA-planSets . RP-93 RP-212442 2765 . I. F. Correction to description of pCA-planSets . RP-93 RP-212442 2765 . I. F. Correction to description of pCA-planSets . RP-93 RP-212442 2765 . I. F. MiBl correction on subCarrierSpacingCormnon . RP-93 RP-212442 2760 . F. Correction to meast for conditional reconfiguration . RP-93 RP-212440 2765 . 2. F. Miscellaneous non-controversial corrections Set XI . RP-93 RP-212440 2765 . 2. F. Miscellaneous non-controversial corrections Set XI . RP-93 RP-212440 2765 . 2. F. Correction to Sa 331 on the field description of magA-TransMax . RP-93 RP-212440 2767 . F. Correction on Repetition-SchemeConfig for aMIMO . RP-93 RP-212443 2776 . F. Correction on Repetition-SchemeConfig for aMIMO . RP-93 RP-212443 2769 . A. Correction on RRC reconfiguration for fast MCG link recovery . RP-93 RP-212443 2769 . A. Correction on RRC processing delay for HO from E-UTRA to NR . RP-93 RP-212443 2769 . F. Carrection on RRC processing delay for HO from E-UTRA to NR . RP-93 RP-212443 2769 . F. Carrection on RRC processing delay for HO from E-UTRA to NR . RP-93 RP-212439 2769 . F. Correction on RRC processing delay for HO from E-UTRA to NR . RP-93 RP-212449 2760 . F. Carrection on Inter-RAT measurement report triggering . RP-93 RP-212442 2800 . F. Correction to DAFS handover RP-93 RP-212442 2800 . F. Correction to DAFS handover RP-93 RP-212442 2800 . F. Correction to DAFS handover RP-93 RP-212442 2800 . F. Correction to DAFS handover RP-93 RP-212442 2800 . F. Correction to DAFS handover RP-93 RP-212442 2800 . F. Correction to make a substantial report of the RP-93 RP-212442 2800 . F. Correction				_			16.6.0
RP-93 RP-212441 2715 1 F Miscellaneous corrections on TS 38.331 RP-93 RP-212442 2723 1 F Corrections to intra-frequency cell reselection for MIB, SiB1 acquisition failure and TAC absence in SiB1 RP-93 RP-212442 2723 1 F Correction to intra-frequency cell reselection for MIB, SiB1 acquisition failure and TAC absence in SiB1 RP-93 RP-212442 2723 1 F Correction to description of pC-Ipmasets RP-93 RP-212442 2726 1 F Correction to the NPN-IdentifyInfoList RP-93 RP-212442 2726 1 F Modification of measald for conditional reconfiguration RP-93 RP-212442 2760 2 F MIB Correction on the NPN-IdentifyInfoList RP-93 RP-212442 2760 2 F MIB Correction on subCarrierSpacingCommon RP-93 RP-212442 2760 2 F MIB Correction on subCarrierSpacingCommon RP-93 RP-212442 2760 2 F Correction on RRC recordiguration of magA-TransMax RP-93 RP-212449 2761 F Correction on RRC recordiguration for fast MGG link recovery RP-93 RP-212449 2776 1 F Correction on RRC recordiguration for fast MGG link recovery RP-93 RP-212449 2776 7 F Correction on RRC recordiguration for fast MGG link recovery RP-93 RP-212449 2785 1 F Correction on RRC processing delay for HO from E-UTRA to NR RP-93 RP-212439 2785 1 F Clarification on RRC processing delay for HO from E-UTRA to NR RP-93 RP-212439 2789 1 A Correction on Intel-RAT measurement report triggering RP-93 RP-212442 2800 1 F Correction to DAPS handover RP-93 RP-212442 2801 1 F Correction to DAPS handover RP-93 RP-212442 2801 1 F Correction to DAPS handover RP-93 RP-212442 2801 1 F Correction to DAPS handover RP-93 RP-212440 2801 2 F No support for CHO with SCG configuration RP-93 RP-212440 2803 F No support for CHO with SCG configuration RP-93 RP-212440 2803 F No support for CHO with SCG configuration RP-94 RP-213341 2806 2 F SON-MDT Changes agreed in RAN2#115 meeting RP-94 RP-213342 2815 1 F Missellaneous corrections for To 36.331 RP-94 RP-213342 2815 1 F Missellaneous corrections for To 36.331 RP-94 RP-213342 2815 1 F Correction to DAPS handover RP-95 RP-223342 2815 1 F Correction on Description of Missellane				1			16.6.0
RP-93 RP-212442 2723 1 F Correction to intra-frequency cell reselection for MIB, SIB1 acquisition failure and TAC absence in SIB1 RP-93 RP-212442 2728 1 F Correction to description of pCd format 1, 2 RP-93 RP-212442 2726 1 F Correction to description of pCd format 1, 2 RP-93 RP-212442 2763 1 F Correction to description of pCd format 1, 2 RP-93 RP-212442 2763 1 F Modification on the NPN-IdentityInfoList RP-93 RP-212443 2754 1 F Modification of meastld for conditional reconfiguration RP-93 RP-212442 2760 F Correction to subCarrierSpacingCommon RP-93 RP-212442 2763 1 F Miscellaneous non-controversial corrections Set XI RP-93 RP-212441 2776 1 F Correction to 38.331 on the field description of risk MCG link recovery RP-93 RP-212441 2777 F Correction on RRC processial corrections Set XI RP-93 RP-212438 2780 A Correction on RRC processing delay for HO from E-UTRA to NR RP-93 RP-212439 2785 1 F Correction on RRC processing delay for HO from E-UTRA to NR RP-93 RP-212439 2785 1 F Carrier on Intel-RAT measurement report triggering RP-93 RP-212439 2789 1 F CR for UE reporting Tx DC location into for the second PA RP-93 RP-212439 2799 2 A Correction on intel-RAT measurement report triggering RP-93 RP-212439 2799 2 A Correction on intel-RAT measurement report triggering RP-93 RP-212449 2800 1 F Correction to DAPS handover RP-93 RP-212441 2800 1 F Correction to DAPS handover RP-93 RP-212441 2800 1 F Correction to DAPS handover RP-93 RP-212441 2800 1 F Correction to DAPS handover RP-93 RP-212441 2800 1 F Correction to DAPS handover RP-93 RP-212442 2801 F Correction to DAPS handover RP-93 RP-212442 2801 F Correction to DAPS handover RP-93 RP-212440 2806 F RP-187 RP-21341 2807 F RP-187 RP-21341 2807 F RP-2134				-			16.6.0
RP-93 RP-212442				1			16.6.0 16.6.0
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RP-93 RP-212442 2748 F Correction to description of pO-AlphaSets RP-93 RP-212442 2746 F Clarification on the NPN-LifentityInfoList RP-93 RP-212442 2752 F Modification of meastle for conditional reconfiguration RP-93 RP-212442 2760 F MilB correction on subCarrierSpacingCommon RP-93 RP-212442 2760 F MilB correction on subCarrierSpacingCommon RP-93 RP-212442 2760 F Corrections on RSC reconfiguration fresh SM XI RP-93 RP-212442 2776 F Corrections on RRC reconfiguration for test SM XI RP-93 RP-212442 2777 F Corrections on RRC reconfiguration for test SM XI RP-93 RP-21243 2780 C Correction on Representation on RSC reconfiguration for SM XI RP-93 RP-21243 2785 F Correction on Representation on RSC reconfiguration for SM XI RP-93 RP-21243 2785 F C Correction on Representation on RSC reconstruction on RSC RP-93 RP-21243 2789 T C Rof for UE reporting Tx CO Location in for for the second PM RP-93 RP-21243 2799 A Correction on Inter-RAT measurement report triggering RP-93 RP-212442 2800 F Correction on inter-RAT measurement report triggering RP-93 RP-212442 2801 F Corrections to pdsch-HARC-ACK-CodeBookList RP-93 RP-212442 2800 F Correction to DAPS handover RP-93 RP-212442 2800 F Correction to DAPS handover RP-93 RP-212442 2800 F Correction to DAPS handover RP-93 RP-212442 2800 F Correction SM XI MILB RP-94 RP-213343 2814 F Correction SM XI MILB RP-95 RP-212442 2807 F Handling of candidateBeamRSListEx-v1610 (option A1) RP-93 RP-212440 2804 F Correction SM XI MILB RP-95 RP-213343 2815 F C R to 38.331 on correcting Re-15 failure type definition RP-94 RP-213342 2815 F Correction on magh SubcarrierSpacing RP-94 RP-213343 2825 F Correction on magh SubcarrierSpacing RP-94 RP-213343 2825 F Correction on magh SubcarrierSpacing RP-94 RP-2	RP-93	RP-212442	2723	1	F		16.6.0
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RP-93 RP-212442 2752 1 F Modification of measil for conditional reconfiguration RP-93 RP-212442 2760 F Mills correction on subCarrierSpacingCommon RP-93 RP-212442 2760 F Correction to 38.331 on the field description of msgA-TransMax RP-93 RP-212442 2776 T F Correction to 38.331 on the field description of msgA-TransMax RP-93 RP-212442 2777 F Correction to 7 Correction on Representation of the first of t				_			16.6.0
RP-93 RP-212443				_			16.6.0
RP-93 RP-212442 2760 F Correction to 38.331 on the field description of msgA-TransMax RP-93 RP-212440 2763 F Miscellaneous non-controversial corrections Set XI RP-93 RP-212442 2777 F Corrections on RRC reconfiguration for fast MCG link recovery RP-93 RP-212442 2777 F Corrections on RRC reconfiguration for fast MCG link recovery RP-93 RP-212432 2785 T Correction on RapetitionSchemeConfig for eMIMO RP-93 RP-212433 2785 T F Clarification on RRC processing delay for HO from E-UTRA to NR RP-93 RP-212433 2793 A Correction on RRC processing delay for HO from E-UTRA to NR RP-93 RP-212439 2799 A Correction on inter-RAT measurement report triggering RP-93 RP-212442 2800 T F Correction on inter-RAT measurement report triggering RP-93 RP-212442 2800 T F Correction to part of the value				_			16.6.0
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RP-93 RP-212441 2776 F Corrections on RRC reconfiguration for fast MCG link recovery RP-93 RP-212432 2780 A Correction on RepetitionSchemeConfig for eMIMO RP-93 RP-212438 2780 A Correction on fallback band combination for SUL RP-93 RP-212438 2789 F Clarification on RRC processing delay for HO from E-UTRA to NR RP-93 RP-212438 2793 F Clarification on RRC processing delay for HO from E-UTRA to NR RP-93 RP-212439 2799 F CR for UE reporting Tx DC location info for the second PA RP-93 RP-212439 2799 A Correction on reconfigurationWithSync RP-93 RP-212442 2800 F Correction on reconfigurationWithSync RP-93 RP-212442 2801 F Correction to DAPS handover RP-93 RP-212442 2801 F Correction to DAPS handover RP-93 RP-212442 2803 F No support for CHO with SCG configuration RP-93 RP-212440 2804 F CR to 38.331 no correcting Rel-15 failure type definition RP-93 RP-212440 2804 F CR to 38.331 no correcting Rel-15 failure type definition RP-93 RP-212440 2804 F ROS ASS 310 no correcting Rel-15 failure type definition RP-93 RP-212440 2804 F FRIFFE differentiation for enhanced UL grant skipping capabilities RP-94 RP-213341 2806 F RT-17				2			16.6.0
RP-93 RP-212438 2780 A Correction on fallback band combination for SUL				_			16.6.0
RP-93 RP-212438 2780 A Correction on fallback band combination for SUL	RP-93	RP-212442		<u>[-</u>	F	Ŭ ,	16.6.0
RP-93 RP-212443 2789 1 F CR for UE reporting Tx DC location info for the second PA				Ŀ		Correction on fallback band combination for SUL	16.6.0
RP-93 RP-212439 2793	RP-93	RP-212439	2785	1			16.6.0
RP-93 RP-212442 2800 1 F Correction to DAPS handover RP-93 RP-212442 2800 1 F Correction to DAPS handover RP-93 RP-212442 2801 - F Correction to DAPS handover RP-93 RP-212442 2801 - F Corrections to pdsch-HARQ-ACK-CodeBookList RP-93 RP-212442 2803 - F SON-MDT Changes agreed in RAN2#115 meeting RP-93 RP-212440 2804 2 F CR to 38.331 on correcting Rel-15 failure type definition RP-93 RP-212440 2804 2 F CR to 38.331 on correcting Rel-15 failure type definition RP-93 RP-212440 2807 - F Handling of candidateBeamRS.ListEx-V1610 (option A1) RP-93 RP-212440 2808 - F FR1/FR2 differentiation for enhanced UL grant skipping capabilities RP-93 RP-212588 2810 2 C Distinguishing support of extended band n77 RP-94 RP-213341 2806 - A Simultaneous RXTx UE capability per band pair RP-94 RP-213342 2815 1 F Correction on msgA-subcarrierSpacing RP-94 RP-213342 2815 1 F Correction on msgA-subcarrierSpacing RP-94 RP-213344 2819 1 F Correction on R16 UE capability of supportedSINR-meas-r16 RP-94 RP-213344 2819 1 F Correction on R16 UE capability of supportedSINR-meas-r16 RP-94 RP-213343 2842 1 F Correction on R16 UE capability of supportedSINR-meas-r16 RP-94 RP-213343 2842 1 F Correction on description of absoluteFrequencySSB RP-94 RP-213343 2845 1 F Correction on condRRCReconfig field description RP-94 RP-213343 2845 1 F Correction on beacription of absoluteFrequencySSB RP-94 RP-213343 2845 1 F Correction on beacryption of absoluteFrequency Set XII RP-94 RP-213343 2845 1 F Correction on supportNevDMRS-Port-r16 capability of XID X				1			16.6.0
RP-93 RP-212442 2800				<u> -</u>			16.6.0
RP-93 RP-212442 2801 F Corrections to pdsch-HARQ-ACK-CodeBookList							16.6.0
RP-93				1			16.6.0
RP-93 RP-212442 2803 F No support for CHO with SCG configuration RP-93 RP-212440 2804 F F CR to 38.331 on correcting Rel-15 failure type definition RP-93 RP-212442 2807 F Handling of candidateBeamRSListEx+1610 (option A1) RP-93 RP-212442 2808 F FR1/FR2 differentiation for enhanced UL grant skipping capabilities RP-93 RP-212598 2810 2 C Distinguishing support of extended band n77 State of the state				-			16.6.0
RP-93 RP-212440 2804 2 F CR to 38.331 on correcting Rel-15 failure type definition RP-93 RP-212442 2807 F Handling of candidateBeamRSListExt-v1610 (option A1) RP-93 RP-212440 2808 F FR1/FR2 differentiation for enhanced UL grant skipping capabilities RP-93 RP-212598 2810 2 C Distinguishing support of extended band n77				-			16.6.0
RP-93 RP-212442 2807 F Handling of candidateBeamRSListExt-v1610 (option A1) RP-93 RP-212598 2810 2 C Distinguishing support of extended band n77 12/2021 RP-94 RP-213341 2806 2 A Simultaneous Rx/Tx UE capability per band pair RP-94 RP-213341 2814 F Correction on msgA-SubcarrierSpacing RP-94 RP-213342 2815 F Miscellaneous corrections on TS 38.331 RP-94 RP-213342 2817 I C Duty cycle signalling for power class 1.5 RP-94 RP-213342 2817 I C Duty cycle signalling for power class 1.5 RP-94 RP-213344 2819 I F Correction on R16 UE capability of supportedSINR-meas-r16 RP-94 RP-213344 2822 F Correction on R16 UE capability of supportedSINR-meas-r16 RP-94 RP-213343 2822 F Correction on R16 UE capability of supportedSINR-meas-r16 RP-94 RP-213343 2842 F Correction on condRRCReconfig field description RP-94 RP-213343 2844 I F Miscellaneous non-controversial corrections Set XII RP-94 RP-213343 2845 I F Correction to need code for drb-ContinueEHC-DL and drb-ContinueEHC-UL RP-94 RP-213343 2849 I F Correction on supportNewDMRS-Port-r16 capability RP-94 RP-213343 2857 I F Correction on supportNewDMRS-Port-r16 capability RP-94 RP-213345 2859 I C Correction on supportNewDMRS-Port-r16 capability RP-94 RP-213345 2862 F Correction on pucch-SpatialRelationInfold-v1610 RP-95 RP-220835 2786 F Addition of missing description on mobility support for 5G SRVCC to 3G RP-95 RP-220835 2786 F Correction on New Port Port Port Port Port Port Port Port				-			16.6.0
RP-93 RP-212490 2808 F FR1/FR2 differentiation for enhanced UL grant skipping capabilities RP-93 RP-212598 2810 C Distinguishing support of extended band n/77 12/2021 RP-94 RP-213341 2806 2 A Simultaneous Rx/Tx UE capability per band pair RP-94 RP-213342 2815 1 F Correction on msgA-SubcarrierSpacing RP-94 RP-213342 2815 1 F Miscellaneous corrections on TS 38.331 RP-94 RP-213342 2817 1 C Duty cycle signalling for power class 1.5 RP-94 RP-213344 2819 1 F Correction on R16 UE capability of supportedSINR-meas-r16 RP-94 RP-213344 2837 2 F Correction on description of absolute FrequencySSB RP-94 RP-213343 2842 1 F Correction on condRRCReconfig field description RP-94 RP-213343 2842 1 F Correction on condRRCReconfig field description RP-94 RP-213343 2845 1 F Correction on condRRCReconfig field description RP-94 RP-213343 2845 1 F Correction on condRRCReconfig field description RP-94 RP-213343 2849 1 F Extension of pathlossReferenceRSs RP-94 RP-213343 2859 1 F Correction on supportNewDMRS-Port-r16 capability RP-94 RP-213345 2859 1 C Correction on supportNewDMRS-Port-r16 capability RP-94 RP-213345 2859 1 C C C C O 38.331 for introducing UE capability of txDiversity RP-94 RP-213345 2862 F Correction on pucch-SpatialRelationInfold-v1610 RP-95 RP-220835 2876 1 F Correction to RRC reconfiguration for IAB RP-95 RP-220835 2879 1 F Correction on UL skipping with LCH Prioritization in Rel-16 RP-95 RP-220835 2880 1 F Handling of ServingCellConfigCommon RP-95 RP-220473 2903 1 F Correction on Inclusion of TS 38.331 RP-95 RP-220473 2911 5 Correction on invalid symbol pattern RP-95 RP-220473 2911 5 Correction on invalid symbol pattern RP-95 RP-220473 2911 5 Correction on invalid symbol pattern RP-95 RP-220473 2914 5 Correction on invalid symb				2			16.6.0
RP-93 RP-21598 2810 2 C Distinguishing support of extended band n77				-			16.6.0
12/2021 RP-94 RP-213341 2806 2 A Simultaneous Rx/Tx UE capability per band pair RP-94 RP-213342 2815 1 F Correction on msgA-SubcarrierSpacing RP-94 RP-213342 2815 1 F Miscellaneous corrections on Ts 38.331				-			16.6.0
RP-94 RP-213342 2815 1 F Miscellaneous corrections on TS 38.331 RP-94 RP-213342 2817 1 C Duty cycle signalling for power class 1.5 RP-94 RP-213342 2817 1 C Duty cycle signalling for power class 1.5 RP-94 RP-213343 2819 1 F Correction for default value of rb-offset RP-94 RP-213344 2819 1 F Correction on R16 UE capability of supportedSINR-meas-r16 RP-94 RP-213344 2837 2 F Correction on R16 UE capability of supportedSINR-meas-r16 RP-94 RP-213344 2842 1 F Correction on description of absoluteFrequencySSB RP-94 RP-213341 2844 1 F Correction on condRRCReconfig field description RP-94 RP-213343 2845 1 F Correction to need code for drb-ContinueEHC-DL and drb-ContinueEHC-UL RP-94 RP-213343 2849 1 F Extension of pathlossReferenceRSS RP-94 RP-213343 2857 1 F Correction to need code for drb-ContinueEHC-DL and drb-ContinueEHC-UL RP-94 RP-213343 2858 2 F Correction on supportNewDMRS-Port-r16 capability RP-94 RP-213345 2859 1 C Correction on pucch-SpatialRelationInfold-v1610 RP-94 RP-213345 2859 1 C Correction on pucch-SpatialRelationInfold-v1610 RP-94 RP-213345 2862 F CR on inter-frequency gapless measurement RP-94 RP-213344 2864 2 F SON-MDT changes agreed in RAN2#116 meeting 03/2022 RP-95 RP-220835 2874 1 F Correction to RRC reconfiguration for IAB RP-95 RP-220835 2880 1 F Addition of missing description on mobility support for 5G SRVCC to 3G RP-95 RP-220835 2880 1 F Correction on IUskipping with LCH Prioritization in Rel-16 RP-95 RP-220473 2911 F Correction on One Conditional reconfiguration for only one triggered cell RP-95 RP-220473 2911 F Correction on invalid symbol pattern RP-95 RP-220473 2911 F Correction on invalid symbol pattern RP-95 RP-220473 2960 2 F Carrection on Non Ninitiated release of an SCG RP-							16.6.0
RP-94 RP-213342 2815							16.7.0 16.7.0
RP-94 RP-213342 2817				_			16.7.0
RP-94 RP-213344 2819 1 F Correction for default value of rb-offset RP-94 RP-213343 2822 - F Correction on R16 UE capability of supportedSINR-meas-r16 RP-94 RP-213343 2837 2 F Correction on description of absoluteFrequencySSB RP-94 RP-213343 2842 1 F Correction on condRRCReconfig field description RP-94 RP-213343 2845 1 F Correction to need code for drb-ContinueEHC-DL and drb-ContinueEHC-UL RP-94 RP-213343 2845 1 F Correction to need code for drb-ContinueEHC-DL and drb-ContinueEHC-UL RP-94 RP-213343 2849 1 F Extension of pathlossReferenceRSs RP-94 RP-213343 2857 1 F Correction to neucondract supportNewDMRS-Port-r16 capability RP-94 RP-213343 2857 1 F Correction on supportNewDMRS-Port-r16 capability RP-94 RP-213345 2859 1 C CR on 38.331 for introducing UE capability of txDiversity RP-94 RP-213345 2862 - F CR on inter-frequency gapless measurement RP-94 RP-213345 2862 - F CR on inter-frequency gapless measurement RP-94 RP-213344 2864 2 F SON-MDT changes agreed in RAN2#116 meeting 03/2022 RP-95 RP-220835 2786 3 F Adding UE capability of UL MIMO coherence for UL Tx switching RP-95 RP-220835 2879 1 F Correction to RRC reconfiguration for IAB RP-95 RP-220835 2880 1 F Handling of ServingCellConfigCommon RP-95 RP-220835 2880 1 F Correction on UL skipping with LCH Prioritization in Rel-16 RP-95 RP-220835 2897 1 F Correction on Desitioning SRS RP-95 RP-220473 2901 1 F Correction on Nucleasing SRS RP-95 RP-220473 2901 1 F Correction on Nucleasing SRS RP-95 RP-220473 2901 1 F Correction on Nucleasing SRS RP-95 RP-220473 2911 - F Correction on inclusion of selectedPLMN-Identity in RRCResumeComplete RP-95 RP-220473 2912 2 F Introduction of Sidelink power class capability indication RP-95 RP-220473 2939 - A Clarification on HighSpeedConfig for HST				_			16.7.0
RP-94 RP-213343 2822 - F Correction on R16 UE capability of supportedSINR-meas-r16 RP-94 RP-213344 2837 2 F Correction on description of absoluteFrequencySSB RP-94 RP-213343 2842 1 F Correction on condRRCReconfig field description RP-94 RP-213343 2844 1 F Miscellaneous non-controversial corrections Set XII RP-94 RP-213343 2845 1 F Correction to need code for drb-ContinueEHC-DL and drb-ContinueEHC-UL RP-94 RP-213343 2849 1 F Extension of pathlossReferenceRSs RP-94 RP-213343 2857 1 F Correction on supportNewDMRS-Port-r16 capability RP-94 RP-213343 2858 2 F Correction on pucch-SpatialRelationInfold-v1610 RP-94 RP-213345 2859 1 C CR on 38.331 for introducing UE capability of txDiversity RP-94 RP-213345 2869 1 C CR on 38.331 for introducing UE capability of txDiversity RP-94 RP-213344 2864 2 F SON-MDT changes agreed in RAN2#116 meeting 03/2022 RP-95 RP-220835 2786 3 F Adding UE capability of UL MIMO coherence for UL Tx switching RP-95 RP-220473 2874 1 F Correction to RRC reconfiguration for IAB RP-95 RP-220835 2880 1 F Addition of missing description on mobility support for 5G SRVCC to 3G RP-95 RP-220835 2880 1 F Addition of missing description on mobility support for 5G SRVCC to 3G RP-95 RP-220835 2887 1 F Correction on UL skipping with LCH Prioritization in Rel-16 RP-95 RP-220473 2900 1 F Correction on Positioning SRS RP-95 RP-220473 2901 1 F Correction on Positioning SRS RP-95 RP-220473 2903 1 F Miscellaneous corrections on TS 38.331 RP-95 RP-220473 2911 - F Correction on conditional reconfiguration execution for only one triggered cell RP-95 RP-220473 2911 - F Correction on inclusion of selectedPLMN-Identity in RRCResumeComplete RP-95 RP-220473 2939 - A Clarification on HighSpeedConfig for HST				_			16.7.0
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RP-94 RP-213343 2845 1 F Correction to need code for drb-ContinueEHC-DL and drb-ContinueEHC-UL RP-94 RP-213343 2849 1 F Extension of pathlossReferenceRSs RP-94 RP-213343 2857 1 F Correction on supportNewDMRS-Port-r16 capability RP-94 RP-213343 2858 2 F Correction on pucch-SpatialRelationInfold-v1610 RP-94 RP-213345 2859 1 C CR on 38.331 for introducing UE capability of txDiversity RP-94 RP-213345 2862 - F CR on inter-frequency gapless measurement RP-94 RP-213345 2862 - F CR on inter-frequency gapless measurement RP-94 RP-213344 2864 2 F SON-MDT changes agreed in RAN2#116 meeting 03/2022 RP-95 RP-220835 2786 3 F Adding UE capability of UL MIMO coherence for UL Tx switching RP-95 RP-220473 2874 1 F Correction to RRC reconfiguration for IAB RP-95 RP-220835 2879 1 F Addition of missing description on mobility support for 5G SRVCC to 3G RP-95 RP-220835 2880 1 F Handling of ServingCellConfigCommon RP-95 RP-220835 2888 1 F Correction on UL skipping with LCH Prioritization in Rel-16 RP-95 RP-220835 2897 1 F Correction on Positioning SRS RP-95 RP-220472 2900 1 F Correction on NCC storage during re-establishment and Resume RP-95 RP-220473 2911 - F Correction on conditional reconfiguration execution for only one triggered cell RP-95 RP-220473 2911 - F Correction on conditional reconfiguration execution for only one triggered cell RP-95 RP-220473 2911 - F Correction on inclusion of selectedPLMN-Identity in RRCResumeComplete RP-95 RP-220473 2939 - A Clarification on SN initiated release of an SCG RP-95 RP-220473 2960 2 F Clarification on HighSpeedConfig for HST						ů i	16.7.0
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03/2022 RP-95 RP-220506 2459 2 D Inclusive Language Review for TS 38.331 RP-95 RP-220499 2465 2 C Remove the maximum number of MIMO layers restrictions for SUL							17.0.0 17.0.0
RP-95 RP-220499 2465 2 C Remove the maximum number of MIMO layers restrictions for SUL RP-95 RP-220486 2811 5 B Introducing Enhancements to Integrated Access and Backhaul for NR						·	17.0.0

RP-95 RP-220492 2866 1 B Introduction of mobility-state-based cell reselection for NR HSDN (NR_HSD RP-95 RP-220472 2865 2 B Introduction of Mobility-state-based cell reselection for SON and MDT RP-95 RP-220477 2878 1 B Introduction of NR dynamic spectrum sharing RP-95 RP-220481 2887 1 B Introduction of MINT [MINT] RP-95 RP-220481 2887 1 B Introduction of MINT [MINT] RP-95 RP-220481 2887 1 B Introduction of MINT [MINT] RP-95 RP-220481 2887 1 B Introduction of PROME RP-95 RP-220472 2889 1 F Correction on PO determination for UE in inactive state RP-95 RP-220472 2891 2 B Extending NR operation to 71 GHz RP-95 RP-220472 2898 2 B Introduction of FR2 UL gap for Rel-17 RP-95 RP-220483 2901 1 B Release-17 UE capabilities based	17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0
RP-95 RP-220477 2878 1 B Introduction of NR dynamic spectrum sharing RP-95 RP-220837 2883 1 B Introduction of MINT [MINT] RP-95 RP-220481 2887 1 B Introduction of enhanced IIoT&URLLC support for NR RP-95 RP-220472 2889 1 F Correction on PO determination for UE in inactive state RP-95 RP-220475 2891 2 B Extending NR operation to 71 GHz RP-95 RP-220497 2898 2 B Introduction of FR2 UL gap for Rel-17 RP-95 RP-220497 2898 2 B Introduction of function for RRM enhancements for Rel-17 NR FR1 HST RP-95 RP-220483 2901 1 B Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331) RP-95 RP-220476 2902 1 B RRC CR for NR Sidelink enhancement RP-95 RP-220495 2904 1 B Introducing support of UP IP for EPC connected architectures using NR PD RP-95 RP-220491 2910 2 B Introduction of SL relay RP-95 RP-220502 2913 2 B Introduction of RR C signaling for measurement gap enhancement RP-95 RP-220488 2919 1 B Introduction of RR C support for MUSIM RP-95 RP-220490 2921 1 B NR RC CR for RAN slicing RP-95 RP-220491 2924 3 B Introduction of RR RC support for MUSIM RP-95 RP-220493 2925 1 B Introduction of Release-17 feMIMO RP-95 RP-220493 2925 1 B Introduction of Release-17 feMIMO RP-95 RP-220493 2925 3 B Introduction of the support for UDC in NR RP-95 RP-220489 2927 - B Introduction of the support for UDC in NR RP-95 RP-220482 2930 2 B Introduction of Release-17 NTN RP-95 RP-220487 2933 1 B Introduction of Release-17 NTN RP-95 RP-220487 2937 1 B Introduction of SDT RP-95 RP-220496 2940 1 B Introduction of DL 1024 QAM in NR RP-95 RP-220496 2940 1 B Introduction of DL 1024 QAM in NR RP-95 RP-220496 2940 1 B Introduction of DL 1024 QAM in NR RP-95 RP-220496 2940 1 B Introduction of DL 1024 QAM in NR RP-95 RP-220496 2940	17.0.0 17.0.0
RP-95 RP-220837 2883 1 B Introduction of MINT [MINT]	17.0.0 17.0.0
RP-95	17.0.0 17.0.0
RP-95 RP-220472 2889 1 F Correction on PO determination for UE in inactive state	17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0
RP-95 RP-220475 2891 2 B Extending NR operation to 71 GHz	17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0
RP-95 RP-220500 2893 1 B Introduction of FR2 UL gap for Rel-17	17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0
RP-95 RP-220497 2898 2 B Introduction of function for RRM enhancements for Rel-17 NR FR1 HST	17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 MS 17.0.0
RP-95 RP-220838 2901 1 B Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331)	17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 MS 17.0.0
RP-95 RP-220476 2902 1 B RRC CR for NR Sidelink enhancement	17.0.0 CP 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 MS 17.0.0
RP-95 RP-220495 2904 1 B Introducing support of UP IP for EPC connected architectures using NR PD RP-95 RP-220499 2909 1 B RRC configuration for R17 UL Tx switching enhancement RP-95 RP-220491 2910 2 B Introduction of SL relay RP-95 RP-220502 2913 2 B Introduction of RRC signaling for measurement gap enhancement RP-95 RP-220488 2919 1 B Introduction of NR RRC support for MUSIM RP-95 RP-220490 2921 1 B NR RRC CR for RAN slicing RP-95 RP-220474 2923 1 B Introduction of Release-17 feMIMO RP-95 RP-220491 2924 3 B Introduction of Release-17 feMIMO RP-95 RP-220493 2925 1 B Introduction of PowSav in TS 38.331 RP-95 RP-220493 2925 1 B Introducing NPN enhancements: Credentials Holder, UE Onboarding, and I emergency support in SNPNs RP-95 RP-220489 2927 - B Introduction of the support for UDC in NR RP-95 RP-220482 2930 2 B Introduction of NR coverage enhancements in RRC RP-95 RP-220498 2933 1 B HST on FR2 RP-95 RP-220487 2937 1 B Introduction of SDT RP-95 RP-220496 2940 1 B Introduction of DL 1024 QAM in NR	CP 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 MS 17.0.0
RP-95 RP-220499 2909 1 B RRC configuration for R17 UL Tx switching enhancement RP-95 RP-220491 2910 2 B Introduction of SL relay RP-95 RP-220502 2913 2 B Introduction of RRC signaling for measurement gap enhancement RP-95 RP-220488 2919 1 B Introduction of NR RRC support for MUSIM RP-95 RP-220490 2921 1 B NR RRC CR for RAN slicing RP-95 RP-220474 2923 1 B Introduction of Release-17 feMIMO RP-95 RP-220474 2923 1 B Introduction of ePowSav in TS 38.331 RP-95 RP-220493 2925 1 B Introduction of PowSav in TS 38.331 RP-95 RP-220493 2925 1 B Introduction of the support for UDC in NR RP-95 RP-220488 2927 - B Introduction of the support for UDC in NR RP-95 RP-220478 2928 2 B Introduction of NR coverage enhancements in RRC RP-95 RP-220482 2930 2 B Introduction of Release-17 NTN RP-95 RP-220487 2937 1 B Introduction of SDT RP-95 RP-220496 2940 1 B Introduction of DL 1024 QAM in NR	17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 MS 17.0.0
RP-95 RP-220491 2910 2 B Introduction of SL relay	17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 MS 17.0.0
RP-95 RP-220502 2913 2 B Introduction of RRC signaling for measurement gap enhancement	17.0.0 17.0.0 17.0.0 17.0.0 17.0.0 MS 17.0.0
RP-95 RP-220488 2919 1 B Introduction of NR RRC support for MUSIM	17.0.0 17.0.0 17.0.0 17.0.0 MS 17.0.0
RP-95 RP-220490 2921 1 B NR RRC CR for RAN slicing	17.0.0 17.0.0 17.0.0 MS 17.0.0
RP-95 RP-220474 2923 1 B Introduction of Release-17 feMIMO	17.0.0 17.0.0 MS 17.0.0
RP-95 RP-220961 2924 3 B Introduction of ePowSav in TS 38.331 RP-95 RP-220493 2925 1 B Introducing NPN enhancements: Credentials Holder, UE Onboarding, and I emergency support in SNPNs RP-95 RP-220489 2927 - B Introduction of the support for UDC in NR RP-95 RP-220478 2928 2 B Introduction of NR coverage enhancements in RRC RP-95 RP-220482 2930 2 B Introduction of Release-17 NTN RP-95 RP-220498 2933 1 B HST on FR2 RP-95 RP-220487 2937 1 B Introduction of SDT RP-95 RP-220496 2940 1 B Introduction of DL 1024 QAM in NR	17.0.0 MS 17.0.0
RP-95	MS 17.0.0
emergency support in SNPNs	
RP-95 RP-220489 2927 - B Introduction of the support for UDC in NR	17.0.0
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RP-95 RP-220482 2930 2 B Introduction of Release-17 NTN RP-95 RP-220498 2933 1 B HST on FR2 RP-95 RP-220487 2937 1 B Introduction of SDT RP-95 RP-220496 2940 1 B Introduction of DL 1024 QAM in NR	
RP-95 RP-220498 2933 1 B HST on FR2 RP-95 RP-220487 2937 1 B Introduction of SDT RP-95 RP-220496 2940 1 B Introduction of DL 1024 QAM in NR	17.0.0
RP-95 RP-220487 2937 1 B Introduction of SDT RP-95 RP-220496 2940 1 B Introduction of DL 1024 QAM in NR	17.0.0
RP-95 RP-220496 2940 1 B Introduction of DL 1024 QAM in NR	17.0.0
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RP-96 RP-221756 2998 2 B Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331)	17.1.0
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RP-96 RP-221723 3094 - F Editorial correction for NR dynamic spectrum sharing	17.1.0
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RP-96 RP-221754 3138 1 F MBS corrections for TS 38.331 RP-96 RP-221711 3142 - A Correction of Need Code in IE SearchSpace RP-96 RP-221756 3144 1 C Adding UE capability of CSI reporting cross PUCCH SCell group RP-96 RP-221732 3145 2 F Miscellaneous corrections for NR SL Relay RP-96 RP-221716 3151 1 F Miscellaneous corrections for RedCap WI	17.1.0 17.1.0 17.1.0
RP-96 RP-221754 3138 1 F MBS corrections for TS 38.331 RP-96 RP-221711 3142 - A Correction of Need Code in IE SearchSpace RP-96 RP-221756 3144 1 C Adding UE capability of CSI reporting cross PUCCH SCell group RP-96 RP-221732 3145 2 F Miscellaneous corrections for NR SL Relay RP-96 RP-221716 3151 1 F Miscellaneous corrections for RedCap WI RP-96 RP-221727 3154 2 F ePowSav corrections for 38.331	17.1.0 17.1.0 17.1.0 17.1.0
RP-96 RP-221754 3138 1 F MBS corrections for TS 38.331 RP-96 RP-221711 3142 - A Correction of Need Code in IE SearchSpace RP-96 RP-221756 3144 1 C Adding UE capability of CSI reporting cross PUCCH SCell group RP-96 RP-221732 3145 2 F Miscellaneous corrections for NR SL Relay RP-96 RP-221716 3151 1 F Miscellaneous corrections for RedCap WI RP-96 RP-221727 3154 2 F ePowSav corrections for 38.331 RP-96 RP-221736 3164 2 F ASN1 review general corrections	17.1.0 17.1.0 17.1.0 17.1.0 17.1.0
RP-96 RP-221754 3138 1 F MBS corrections for TS 38.331 RP-96 RP-221711 3142 - A Correction of Need Code in IE SearchSpace RP-96 RP-221756 3144 1 C Adding UE capability of CSI reporting cross PUCCH SCell group RP-96 RP-221732 3145 2 F Miscellaneous corrections for NR SL Relay RP-96 RP-221716 3151 1 F Miscellaneous corrections for RedCap WI RP-96 RP-221727 3154 2 F ePowSav corrections for 38.331	17.1.0 17.1.0 17.1.0 17.1.0

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		RP-221756	3179	1	С	Introduction UE capability for CHO with SCG configuration [CHOwithDCkept]	17.1.0
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		RP-221730	3182	-	F	Correction on UE behavior for NAS-based busy indication in RRC_INACTIVE	17.1.0
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		RP-221712	3185	-	Α	Miscellaneous corrections on TS 38.331 for NR V2X	17.1.0
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		RP-221727	3190	-	Α	Addressing inconsistency for RRM measurement rules	17.1.0
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		RP-221716	3195	-	F	Miscellaneous non-controversial corrections Set XIV	17.1.0
		RP-221712	3197	-	A	Correction for the need code and conditions for optional fields in PC5 RRC	17.1.0
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		RP-221794	3204	1	Α	HARQ-ACK multiplexing on PUSCH in the absence of PUCCH	17.1.0
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		RP-222527	3244	1	В	Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331)	17.2.0
		RP-222525 RP-222519	3254 3272	1	F A	Miscellaneous CR on TS 38.331 for ePowSav Correction to 38.331 on NPN-only cell	17.2.0 17.2.0
		RP-222519	3281	1	A	NR-DC Power Control	17.2.0
		RP-222516	3285	1	A	Corrections on s-MeasureConfig in NR	17.2.0
		RP-222523	3289	2	F	MBS corrections for RRC	17.2.0
	RP-97	RP-222524	3303	2	F	Correction CR for QoE Measurement Collection in NR	17.2.0
		RP-222523	3315	1	F	Correction for Simultaneous Transmission of SR and PUSCH	17.2.0
		RP-222521	3321	1	Α	Correction for SRS-PeriodicityAndOffset	17.2.0
		RP-222522	3323	1	F	Miscellaneous corrections to NR coverage enhancements	17.2.0
		RP-222523	3325	2	F	Corrections for Release-17 feMIMO	17.2.0
		RP-222524 RP-222525	3326	2	F	Corrections for Release-17 NTN	17.2.0
		RP-222525 RP-222525	3334 3340	2	F	Corrections on TS 38.331 for RAN Slicing RRC corrections for SDT	17.2.0 17.2.0
		RP-222518	3347	1	A	Miscellaneous CR on 38.331	17.2.0
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		RP-222524	3353	2	F	Miscellaneous correction for Positioning	17.2.0
		RP-222523	3355	1	F	Rapporteur Miscellaneous RRC Corrections for eIAB	17.2.0
		RP-222526	3359	3	F	Correction to MINT - applicableDisasterInfoList [MINT]	17.2.0
		RP-222525	3362	1	F	Miscellaneous non-controversial corrections Set XV	17.2.0
		RP-222520	3395	1	Α	Correction of PUSCH repetition configuration	17.2.0
		RP-222518 RP-222525	3397 3400	1	A F	Clarification of NULL security algorithm Miscellaneous corrections for RedCap WI	17.2.0 17.2.0
		RP-222516	3407	1	A	Corrections on measurement report triggering	17.2.0
		RP-222520	3417	1	A	Clarification on headerCompression for DAPS bearer	17.2.0
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		RP-222519	3424	1	Α	Correction for PUSCH-PowerControl field descriptions for 2-step RACH	17.2.0
	RP-97	RP-222520	3430	1	Α	Correction on PDCCH blind detection capability in CA	17.2.0
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		RP-222523	3440	<u> -</u>	F	CR on 38.331 of field description in PUCCH-Config for PUCCH Carrier Switch	17.2.0
		RP-222518	3451	1	Α	Correction on Missing UE behavior on sidelink reset	17.2.0
	KP-97	RP-222516	3453	1	Α	Clarification on codebookParametersPerBC parameter for extension of CSI-	17.2.0
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		RP-222522	3467	-	F	MsgA PUSCH resource release upon T304 expiry for SCG	17.2.0
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		RP-222521	3473	1	Α	Correction on mpsPriorityIndication	17.2.0
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		RP-222524 RP-222527	3475 3477	[-	F A	Clarification on Joint Gap Configuration Correction to additionalSpectrumEmission for UL CA in n77 for the US	17.2.0 17.2.0
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			3479	l -	1⊢	ICOMPECTION to additional Spectrum Emission for LIL CA in n / / for Canada	11/20
	RP-97	RP-222527	3478 3479	-	F B	Correction to additionalSpectrumEmission for UL CA in n77 for Canada Start drx-HARQ-RTT-TimerUL after last repetition (ulHARQ_RTT_TimerU	17.2.0 17.2.0
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	RP-98	RP-223410	3276	5	F	FR2-2 and CCA configuration	17.3.0
		RP-223414	3486	3	F	Correction to explicit indication of SI Scheduling window position [SI-SCHEDULING]	17.3.0
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	RP-98	RP-223406	3500	4	F	MBS corrections for RRC	17.3.0
		RP-223410	3507	3	F	Clarification on the NR HST configuration	17.3.0
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	RP-98	RP-223412	3541	3	F	Rapporteur CR on TS 38.331 for SL enhancements	17.3.0
		RP-223414	3548	3	С	Correction on E-UTRA cell selection during emergency service fallback and EPS fallback for emergency call [CellSelection_EmergencyFallback]	17.3.0
	RP-98	RP-223412	3549	3	F	Miscellaneous RRC CR for SL relay	17.3.0
	RP-98	RP-223414	3557	2	F	Correction to disasterRoamingFromAnyPLMN [MINT]	17.3.0
	RP-98	RP-223409	3563	5	F	Corrections for further MR-DC enhancements	17.3.0
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	RP-98	RP-223410	3569	3	F	Corrections for Release-17 feMIMO	17.3.0
	RP-98	RP-223411	3570	2	F	Corrections for Release-17 NR NTN	17.3.0
	RP-98	RP-223414	3577	2	В	Parallel PRACH and SRS/PUCCH/PUSCH transmissions across CCs in intraband non-contiguous CA [NC-PRACH-SimulTx]	17.3.0
	RP-98	RP-223410	3606	3	F	Correction to RRC for 71 GHz	17.3.0
	RP-98	RP-223413	3608	2	F	RRC corrections for SDT	17.3.0
	RP-98	RP-223410	3614	1	F	Correction to PDC in RRC	17.3.0
	RP-98	RP-223406	3619	1	Α	Miscellaneous CR on 38.331	17.3.0
	RP-98	RP-223415	3621	2	В	Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331)	17.3.0
	RP-98	RP-223410	3633	2	F	Clarification on the TCI assumption for RSSI measurement for FR2-2	17.3.0
	RP-98	RP-223404	3641	1	Α	38.331 CR on the periodicity of the MIB	17.3.0
	RP-98	RP-223412	3656	2	F	Miscellaneous corrections on TS 38.331 for SL enhancements	17.3.0
	RP-98	RP-223404	3678	2	F	Miscellaneous non-controversial corrections Set XVI	17.3.0
		RP-223413	3698	2	F	Corrections related to FeatureCombinationPreambles	17.3.0
	RP-98	RP-223411	3703	2	F	Correction CR for QoE measurements in NR	17.3.0
	RP-98	RP-223486	3704	2	С	Higher granularity for per-FR gap capability[MaxCCPerFRGap]	17.3.0
	RP-98	RP-223413	3709	1	F	CR on 38.331 for BFD relxation when two BFD-RS sets are configured	17.3.0
	RP-98	RP-223404	3711	2	Α	Exclude the suspendConfig in the UE Inactive AS context	17.3.0
	RP-98	RP-223409	3723	-	F	Clarifications on DMRS bundling for NR Coverage Enhancements	17.3.0
	RP-98	RP-223411	3729	1	F	Corrections on VIRP configuration and gapPriority description	17.3.0
	RP-98	RP-223411	3732	1	F	Miscellaneous corrections for RedCap WI	17.3.0
	RP-98	RP-223412	3736	2	F	Clarification on the determination of NSAG with the NSAG priority	17.3.0
		RP-223413	3741	1	F	RLM and BFD relaxation reporting configurations are missed in the field description of otherConfig while being configured for SCG	17.3.0
	RP-98	RP-223406	3751	2	F	Correction on PUSCH configuration	17.3.0
		RP-223407	3753	-	Α	Correction on frequency hopping	17.3.0
	RP-98	RP-223407	3757	Ŀ	Α	Clarification on the NR HST configuration	17.3.0
	RP-98	RP-223408	3760	2	Α	Clarification on inter-frequency no gap measurements in NR-DC	17.3.0
	RP-98	RP-223409	3761	1	F	Correction to support repetition on PDSCH time domain resource allocation for DCI format 1-2	17.3.0
		RP-223413	3764	_	F	RRC correction on update of last used cell	17.3.0
		RP-223409	3768	<u> </u>	F	Correction on re-establishment procedure while T346g is running	17.3.0
	RP-98	RP-223408	3770	1	F	RRC Correction for SON MDT	17.3.0
	RP-98	RP-223411	3771	_	F	Correction for RACH partitioning with both 2-step and 4-step RA configurations	17.3.0

History

Document history							
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